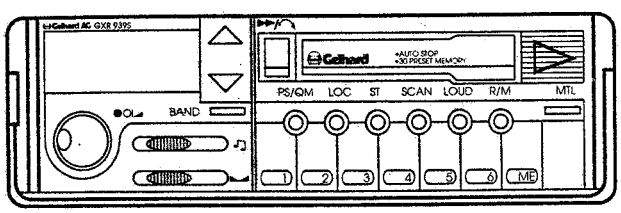
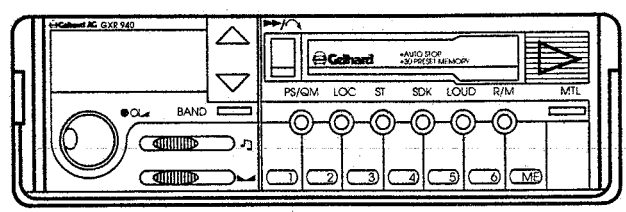
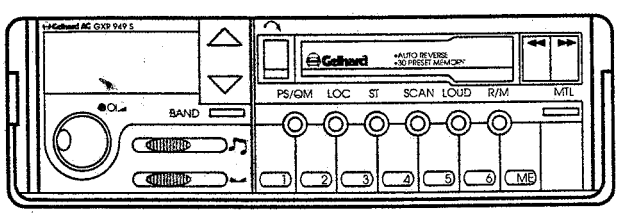
SERVICE MANUAL

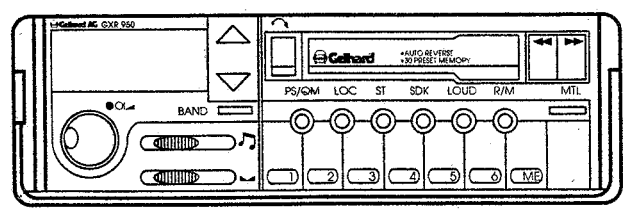
GXR 939S/940/949S/950/953S/954

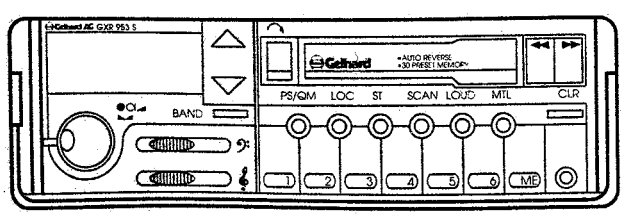
STEREO CAR RADIO CASSETTE PLAYER

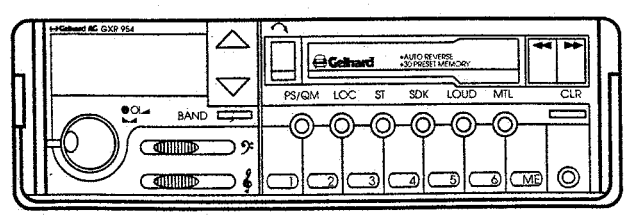












Gelhard®
West Germany

CONTENTS

SPECIFICATION ..... Page 3,4
ALIGNMENT INSTRUCTIONS ..... 5~7
FM TUNER 8
AM TUNER 9
BLOCK DIAGRAM 10
SCHEMATIC DIAGRAM ..... 11~16
WIRING DIAGRAM 17,18
P.C. BOARD ..... 19~21
ELECTRICAL PARTS LIST ..... 22~25
CABINET EXPLODED VIEW ..... 26~31
CABINET PARTS LIST 32,33
MECHANISM EXPLODED VIEW (TN-717MH-01) 34
MECHANISM PARTS LIST (TN-717MH-01) 35,36
MECHANISM EXPLODED VIEW (SM-750) 37
MECHANISM PARTS LIST (SM-750) 38
MECHANISM EXPLODED VIEW (TN-303ZX) 39
MECHANISM PARTS LIST (TN-303ZX) 40,41
IC EQUIVALENT CIRCUITS 41,42
DISPLAY 42
TABLE OF VOLTAGE 42

SPECIFICATIONS

General Section

Power supply:	11–16 Volts
Ground polarity:	Negative (–)

LW Section (GXR 939S/949S/953S)

	Description	Unit	Nominal	Limit
1	Frequency range	kHz	144-281	144±3–281±3
2	Intermediate frequency	kHz	450	450±3
3	Sensitivity for 20 dB S/N at 155 kHz at 205 kHz at 256 kHz	μV μV μV	70 70 70	150 150 150
4	If rejection at 155 kHz	dB	55	45
5	Image rejection at 256 kHz	dB	40	30
6	Bandwidth at 6 dB at 208 kHz	kHz	7	7±3
7	S/N with 5mV at 208 kHz	dB	50	40
8	Distortion at 0.5W input 5mV	%	0.5	2
9	Power output 10% distortion maximum	W W	4.5×2 6×2	4×2 5×2
10	Seek lock-in sensitivity at 208 kHz DX at 208 kHz LOCAL	μV μV	160 900	80–320 400–2000

MW Section

	Description	Unit	Nominal	Limit
1	Frequency range	kHz	522–1620	522±3–1620±3
2	Intermediate frequency	kHz	450	450±3
3	Sensitivity for 20 dB S/N at 603 kHz at 954 kHz at 1386 kHz	μV μV μV	30 30 30	50 50 50
4	Selectivity (off-tuning 9 kHz) at 954 kHz	dB	40	30
5	If rejection at 603 kHz	dB	60	50
6	Image rejection at 1386 kHz	dB	50	40
7	Bandwidth at 6 dB at 954 kHz	kHz	7	7±3
8	S/N with 5 mV at 954 kHz	dB	50	40
9	Distortion at 0.5W input 5 mV	%	0.5	2
10	Power output 10% distortion maximum	W W	4.5×2 6×2	4×2 5×2
11	Seek lock-in sensitivity at 954 kHz DX at 954 kHz LOCAL	μV μV	50 320	25–130 140–600

SPECIFICATIONS

FM–Stereo Section

	Description	Unit	Nominal	Limit
1	Frequency range	MHz	87.5–108.0	87.5±0.05 –108.0±0.05
2	Intermediate frequency	MHz	10.7	10.7±0.05
3	Sensitivity for 30 dB S/N at 90 MHz at 98 MHz at 106 MHz	μV μV μV	2.5 2.5 2.5	5 5 5
4	If rejection at 90 MHz	dB	60	53
5	Image rejection at 98 MHz	dB	50	40
6	S/N with 1 mV input at 98 MHz unweighted	dB	55	50
7	Distortion at 0.5W at 98 MHz	%	0.5	2.0
8	Audio Fidelity –3dB Down (50μs)	Hz	30–12000	60–8000
9	Power output 10% distortion maximum	W W	4.5×2 6×2	4×2 5×2
10	Seek lock-in sensitivity at 98 MHz DX at 98 MHz LOCAL	μV μV	10 32–320	5–15 20–600
11	Separation with 1 mV input at 1000 Hz	dB	35	25
12	Stereo Indicator sensitivity at 98 MHz	μV	5	10

TAPE Section

	Description	TEAC Test Tape	Unit	Nominal	Limit
1	Tape speed at 3000 Hz	MTT-111D	%	0	±3
2	WOW & Flutter at 3000 DIN weighted	MTT-111D	%	0.24	0.35
3	S/N Ratio at 1000 Hz 1W, unweighted	MTT-112B	dB	50	45
4	Trick Crosstalk at 1000 kHz	MTT-121	dB	40	30
5	Channel separation at 1000 kHz	MTT-141	dB	40	30
6	Playback frequency response at 125 Hz, 8 KHz	MTT-217C	dB	0	–4
7	Power output at 1000 Hz 10% distortion maximum	MTT-112B	W W	4.5×2 7×2	4×2 5×2
8	Distortion at 1W, 1000 Hz	MTT-112B	%	1	3

ALIGNMENT INSTRUCTIONS

Equipment Required

1. AM Standard Signal Generator
2. FM Standard Signal Generator
3. Stereo Signal Generator
4. Oscilloscope
5. SSVM (Output Meter)
6. DC Power Supply
7. DC Voltmeter
8. Frequency Counter

Important

1. Non-ferrous tools should be used for this alignment.
2. Signal should be kept as low as possible to avoid clipping.
3. 400Hz modulation with 30% amplitude is to be used for AM standard modulator (1kHz with 40kHz deviation for FM 75kHz=100%)
4. Output impedance to generator should match impedance of dummy antenna.

Tuner Alignment Pre-setting

Pre-setting of the frequency at each adjustment point will make the tuning for easier adjustment.
MW Frequency to be pre-set : 522 KHz 603 kHz 1386 kHz 1620 kHz
FM Frequency to be pre-set : 87.5 MHz 92.3 MHz 96.3 MHz 108 MHz
LW Frequency to be pre-set : 144 kHz 155 kHz 256 kHz 281 kHz

Standard Adjustment Condition

a. Power Supply ..... 14.4V DC
b. Band Selector switch ..... LW, MW or FM
c. Tone control ..... Flat
d. Balance control ..... Center
e. Volume ..... Adjust to get 0.5W power output level.
f. Load impedance ..... 4 Ohm

ADJUSTMENT POINT

Fig. 1

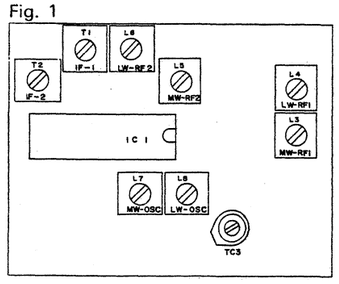


Fig. 2

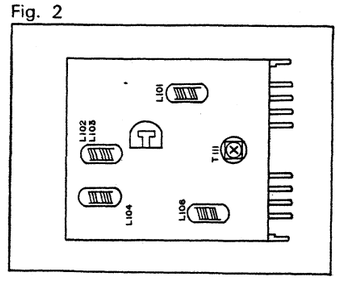
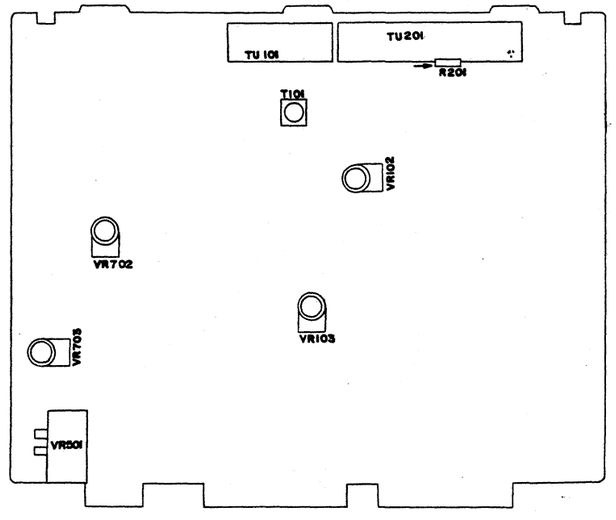
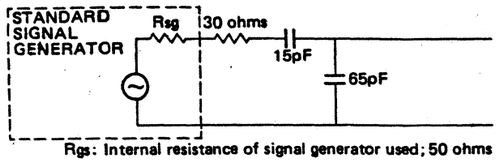


Fig. 3



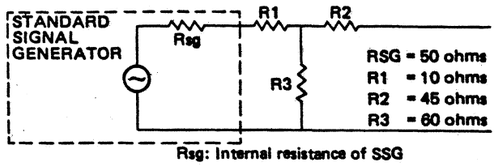
ALIGNMENT INSTRUCTIONS

Dummy antenna for MW and LW alignment



Rgs: Internal resistance of signal generator used; 50 ohms

Dummy antenna for UKW RF alignment



Rsg: Internal resistance of SSG

FM IF

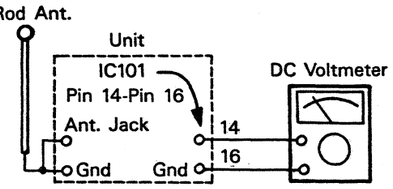


Fig. 4

Circuit Alignment	Equipment Connection	Step	Gen. Freq.	Adjustment
FM IF	Fig. 4 IC101 (Pin 14-Pin 16)		96.3 MHz 1mV output	Fig. 3 Adjust T101 for DC Voltmeter indicates minimum (0V ±0.009)

FM MPX SECTION

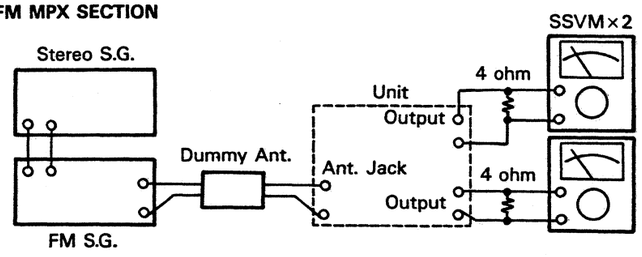


Fig. 7

Circuit Alignment	Equipment Connection	Step	Gen. Freq.	Adjustment
FM Separation	Fig. 7	–	96.3 MHz 1mV Output (R-ch: Non Mod.)	Fig. 3 Adjust VR103 Minimum R-ch Output

FM TUNING VCO

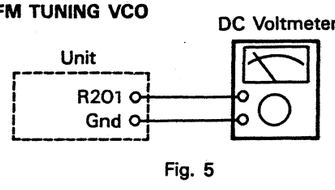


Fig. 5

FM TRACKING

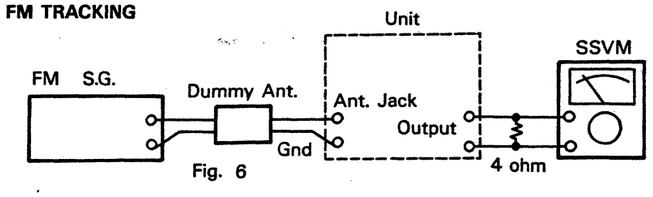


Fig. 6

Circuit Alignment	Equipment Connection	Step	Gen. Freq.	Adjustment
FM Tuning VCO	Fig. 5	–	87.5 MHz	Fig. 2 Adjust L106 for DC Voltmeter indicate 1.4V
FM Tracking	Fig. 6	–	98 MHz	Fig. 2 Adjust L101~104, T111 for SSVM indicate maximum

MW (LW) TUNING VCO

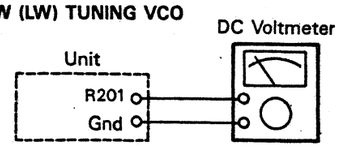


Fig. 8

MW (LW) IF/TRACKING

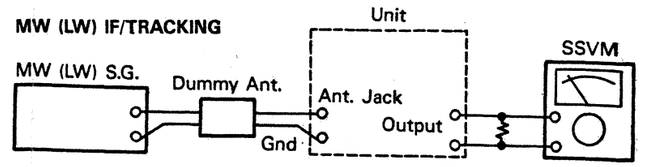


Fig. 9

Circuit Alignment	Equipment Connection	Gen. Freq.	Adjustment
MW Tuning VCO	Fig. 8	522 kHz	Fig. 1 Adjust L7 for DC Voltmeter indicate 1.3V
LW Tuning VCO	Fig. 8	144 kHz	Fig. 1 Adjust L8 for DC Voltmeter indicate 1.6V
MW IF	Fig. 9	450 kHz	Fig. 1 Adjust T1,T2 for SSVM indicate maximum output
MW Tracking	Fig. 9	603 kHz	Fig. 1 Adjust L3,L5 for SSVM indicate max output
LW Tracking	Fig. 9	155 kHz	Fig. 1 Adjust L4,L6 for SSVM indicate max output.

DK VCO

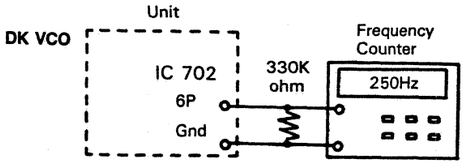
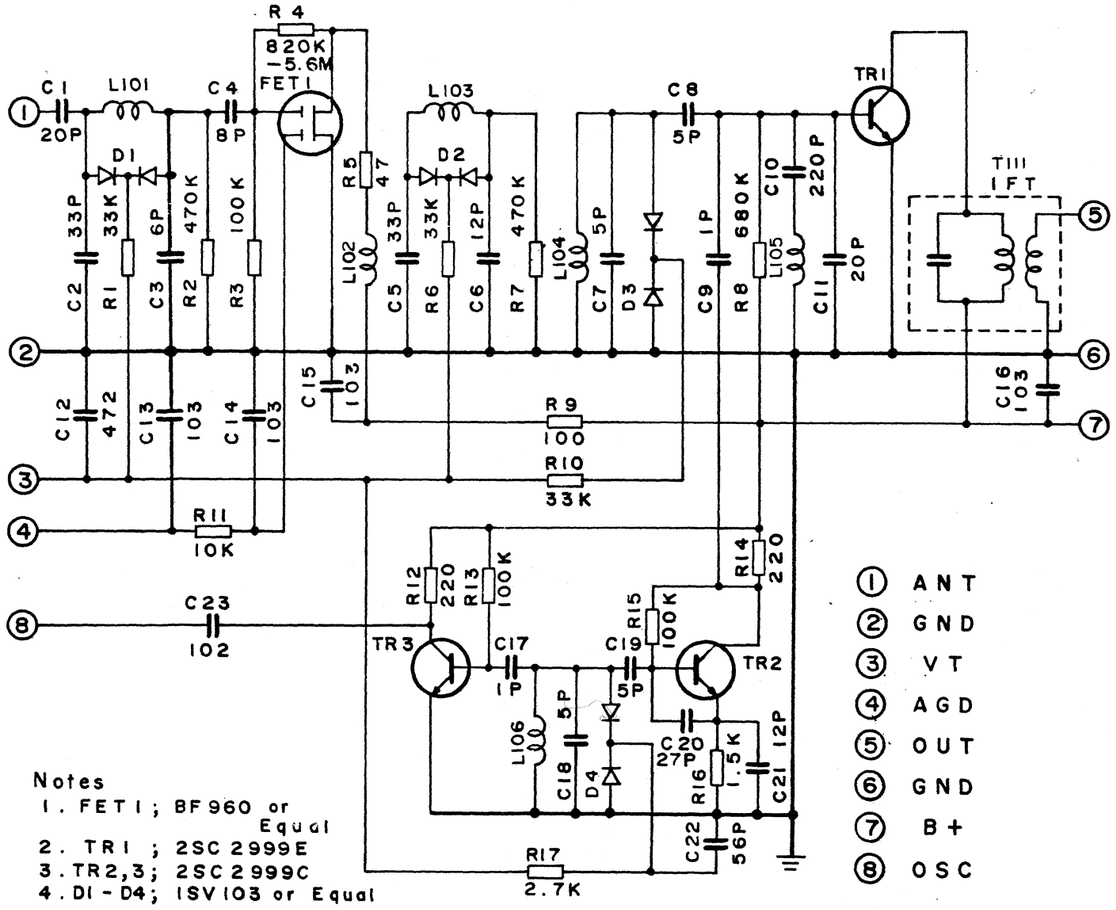


Fig. 10

Circuit Alignment	Equipment Connection	Step	Band	Adjustment
DK VCO	Fig. 10	–	SDK Position	Adjust VR702 for 250Hz ± 0.5Hz

FM TUNER

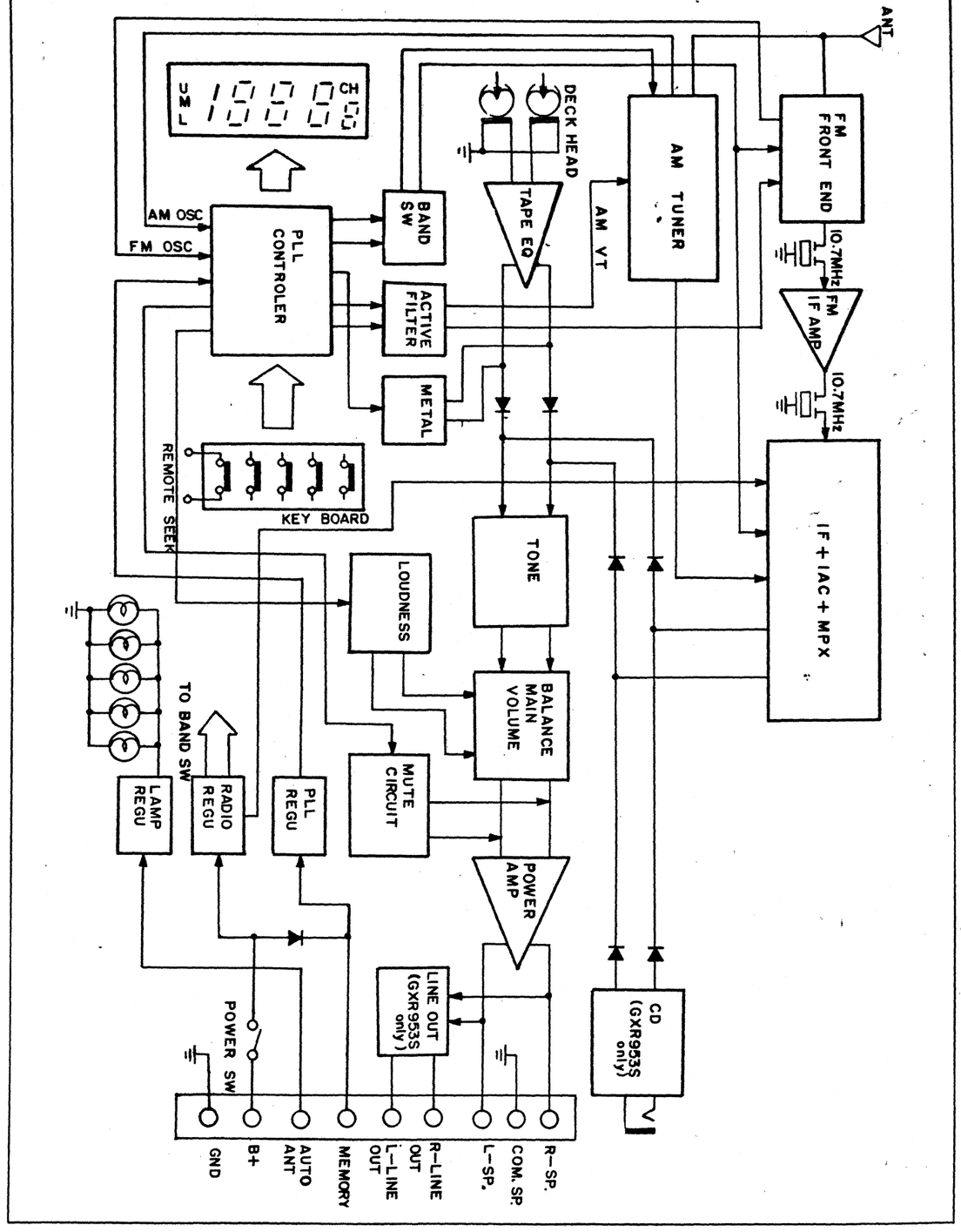
SCHEMATIC DIAGRM



Notes
1. FET1 ; BF960 or Equal
2. TR1 ; 2SC2999E
3. TR2,3; 2SC2999C
4. D1-D4; 1SV103 or Equal

BLOCK DIAGRAM

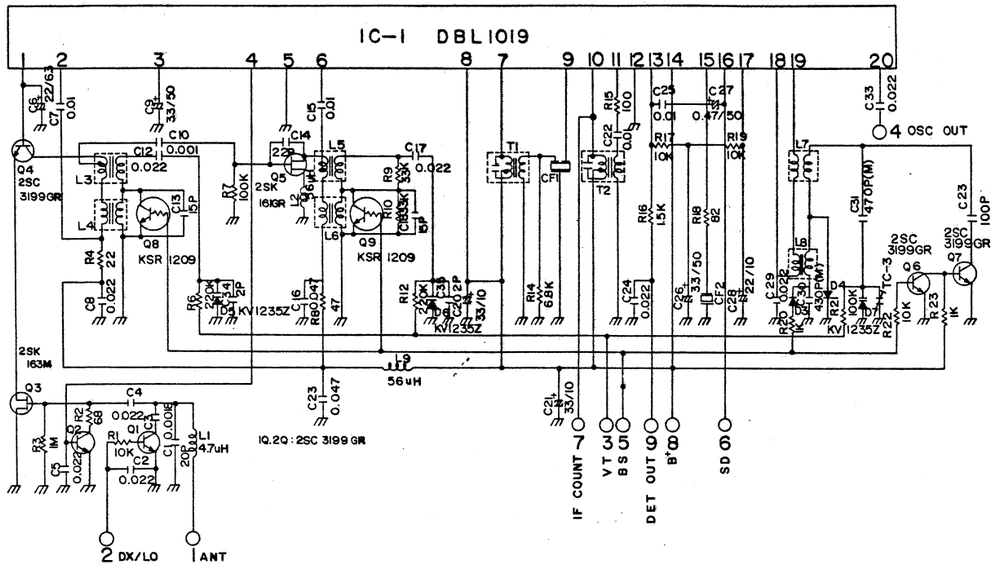
(GXR 939S/949S/953S)



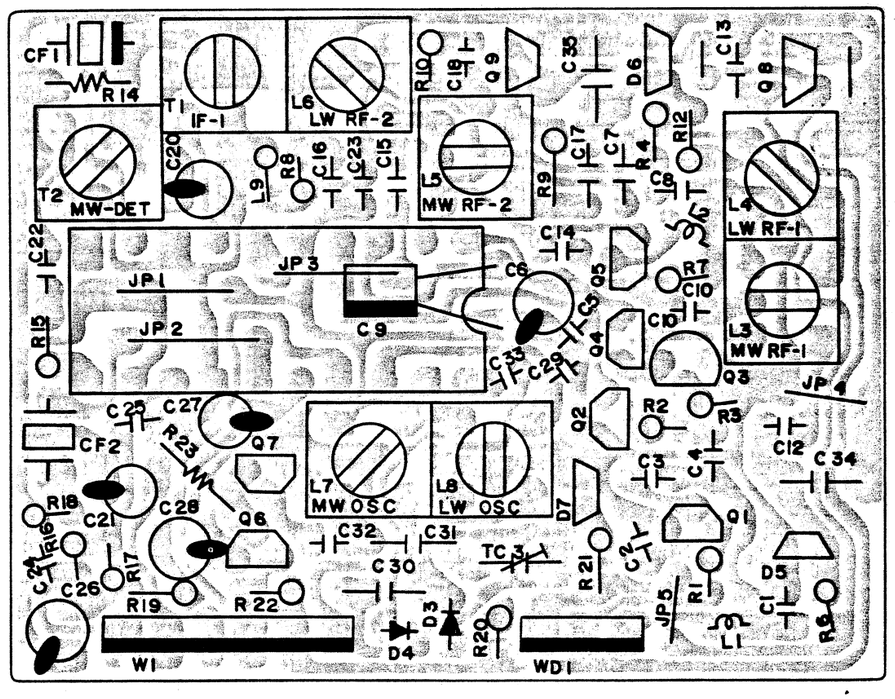
AM TUNER

(GXR 939S/949S/953S)

SCHEMATIC DIAGRAM (MW/LW)

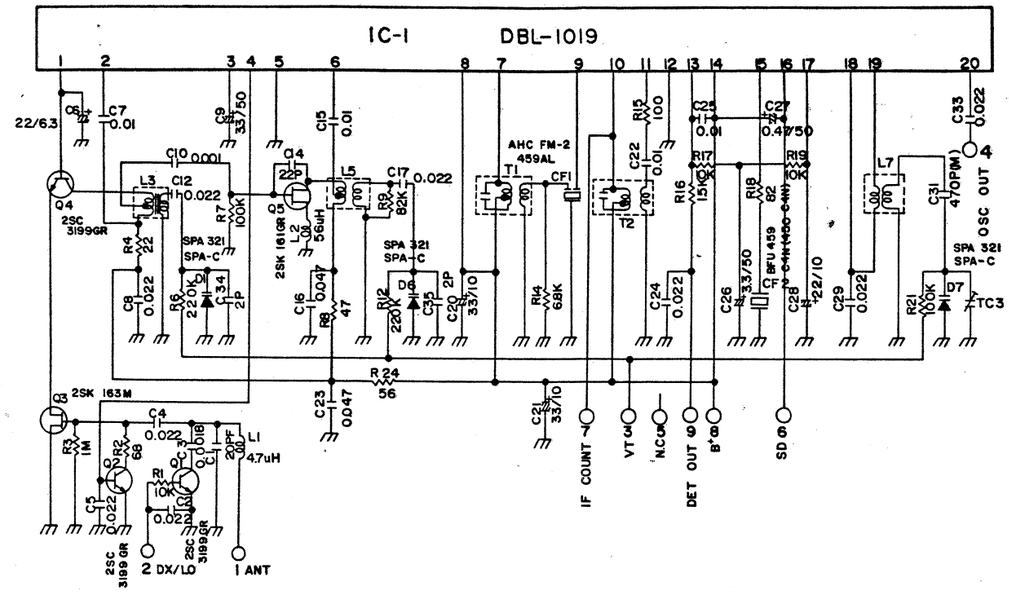


P.C. BOARD (MW/LW)

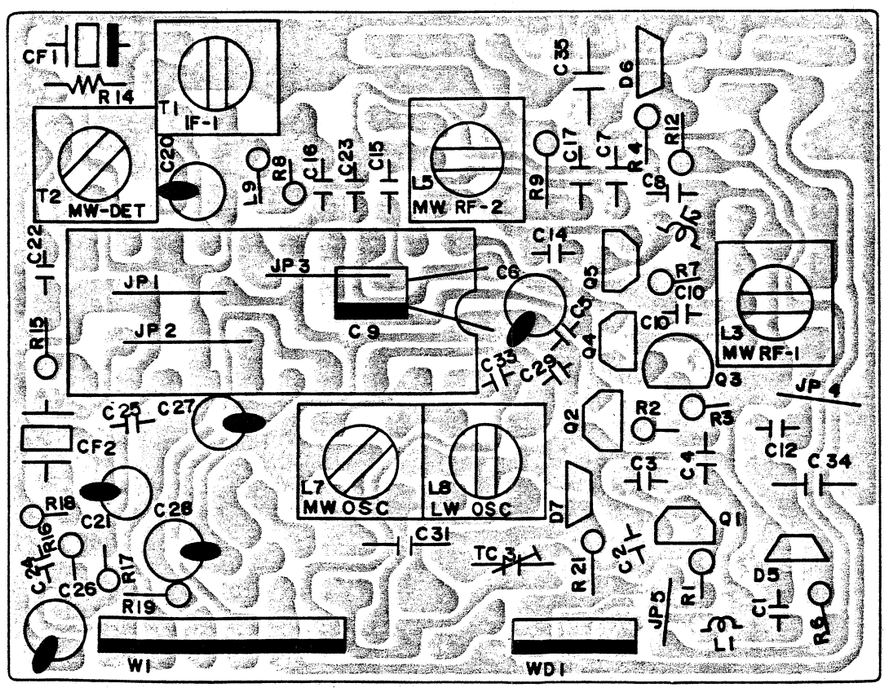


(GXR 940/950/954)

SCHEMATIC DIAGRAM (MW)

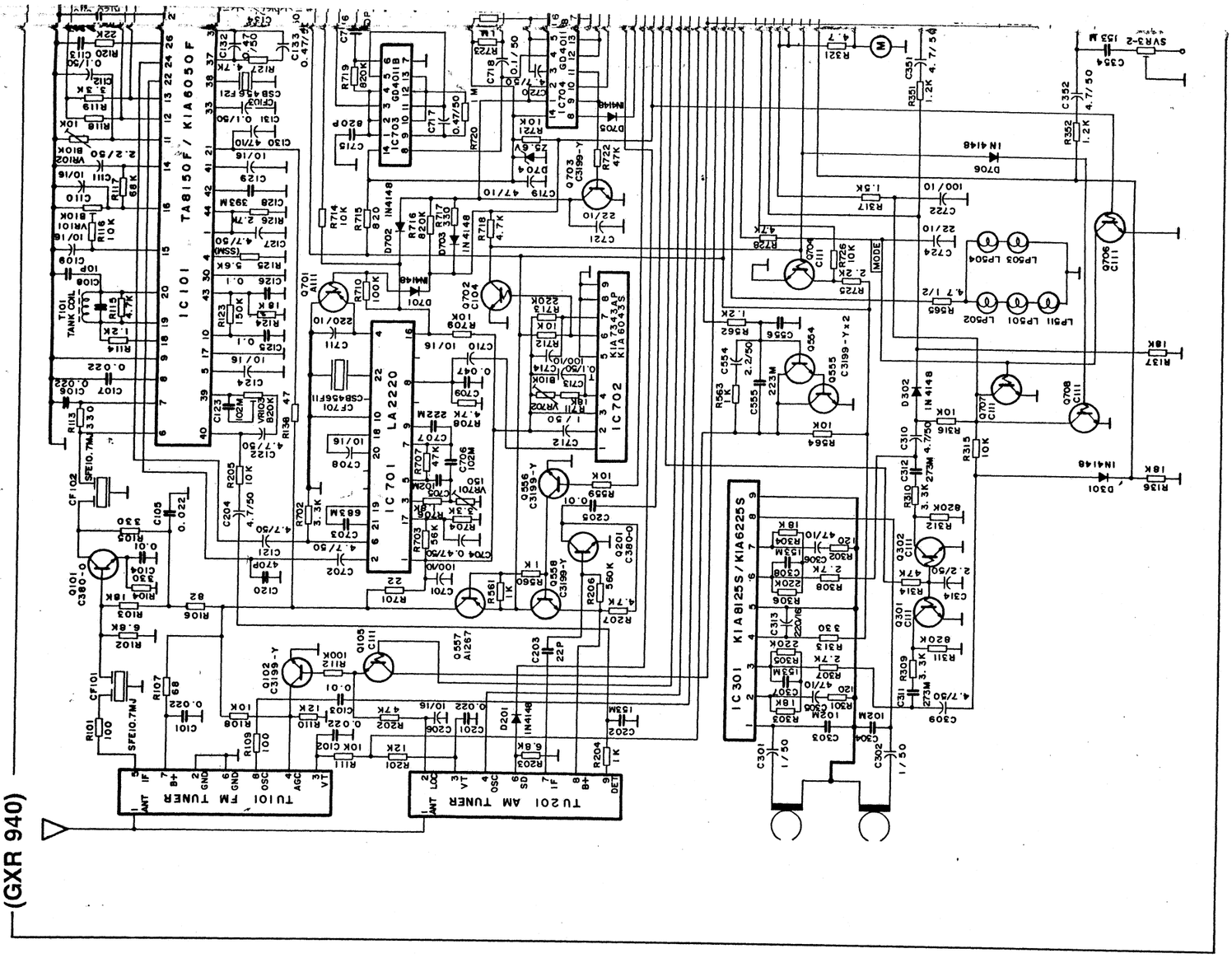


P.C. BOARD (MW)

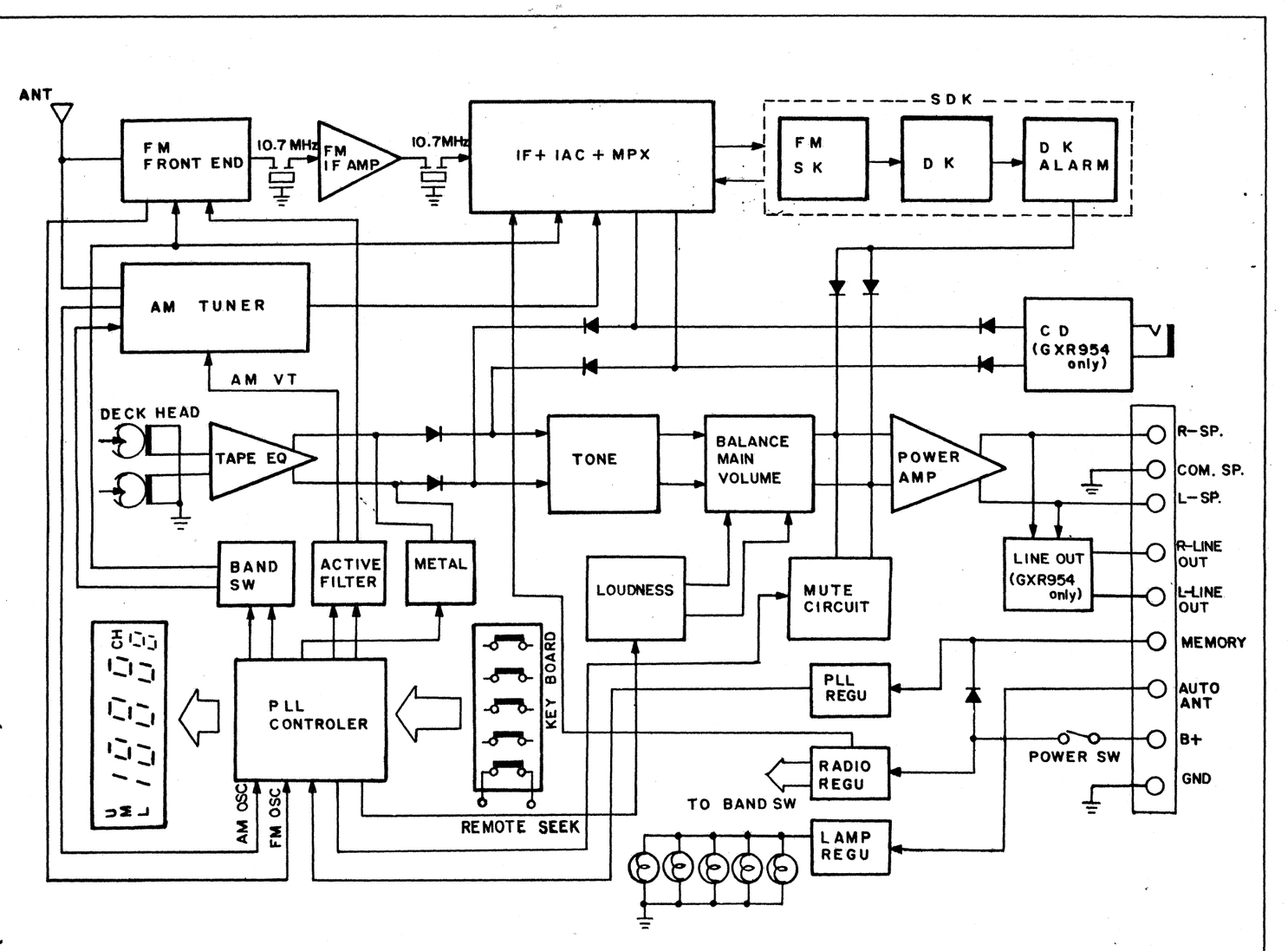


SCHEMATIC DIAGRAM

(GXR 940)

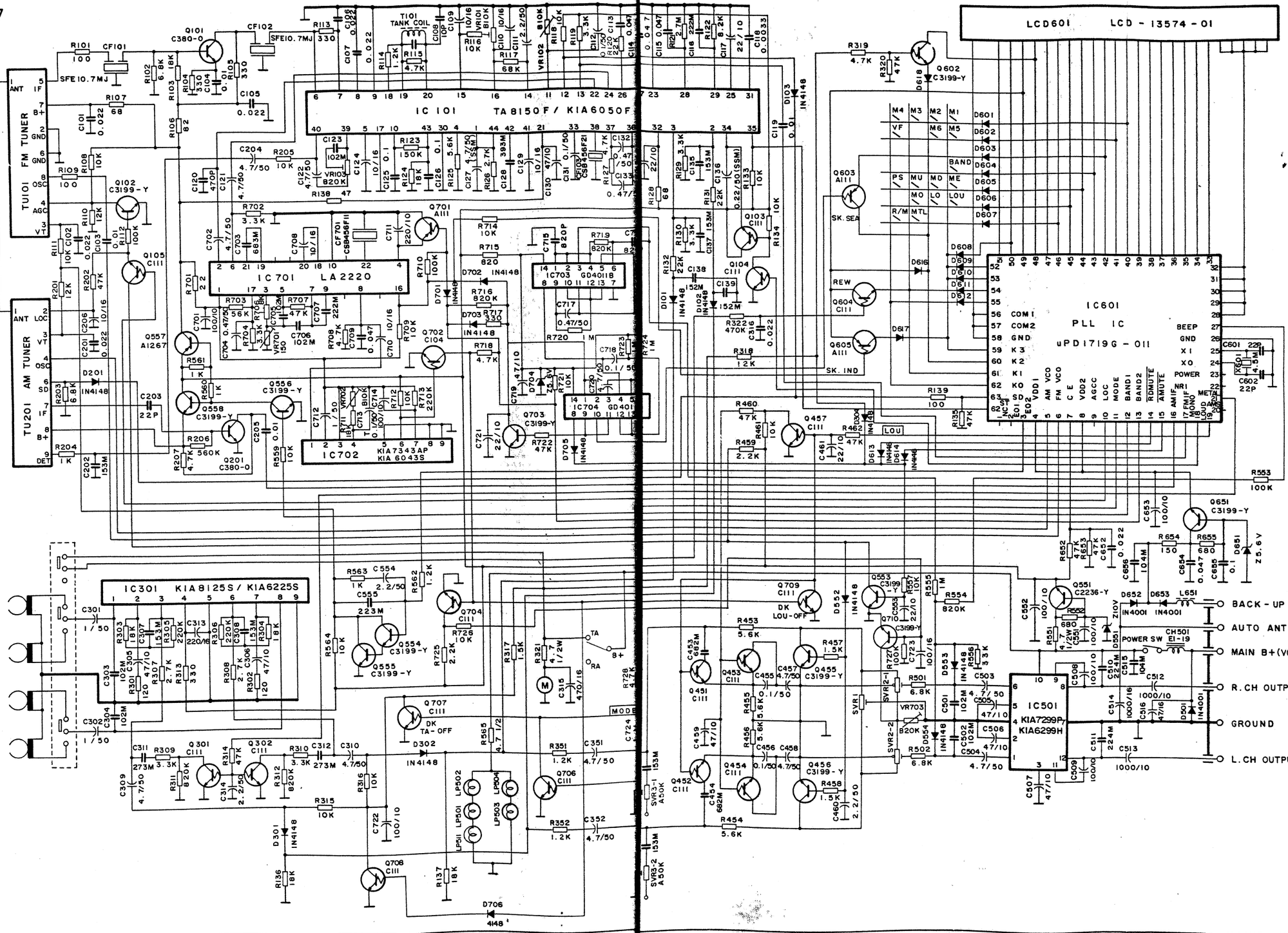


(GXR 940/950/954)



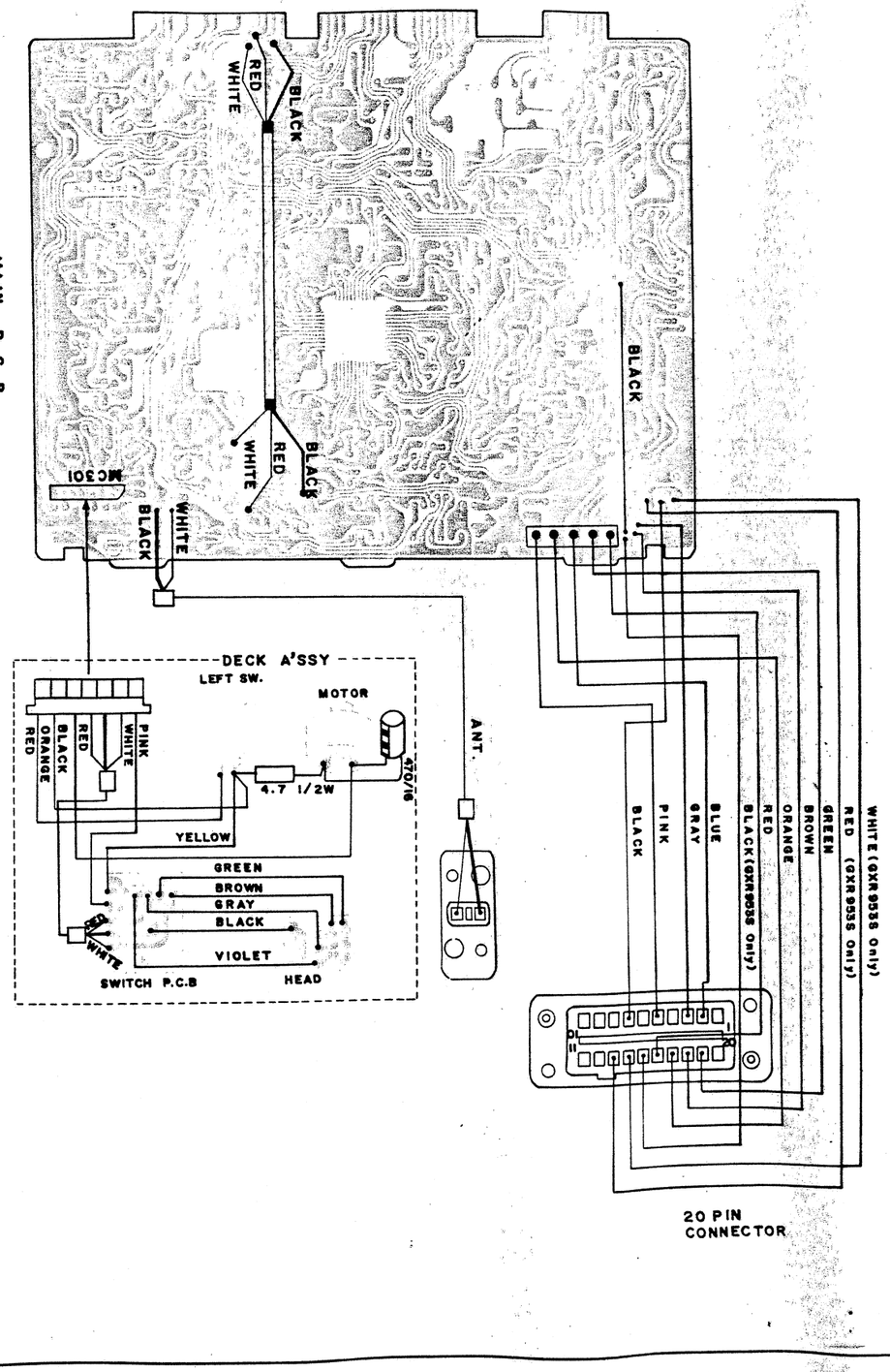
SCHEMATIC DIAGRAM

-(GXR 950)

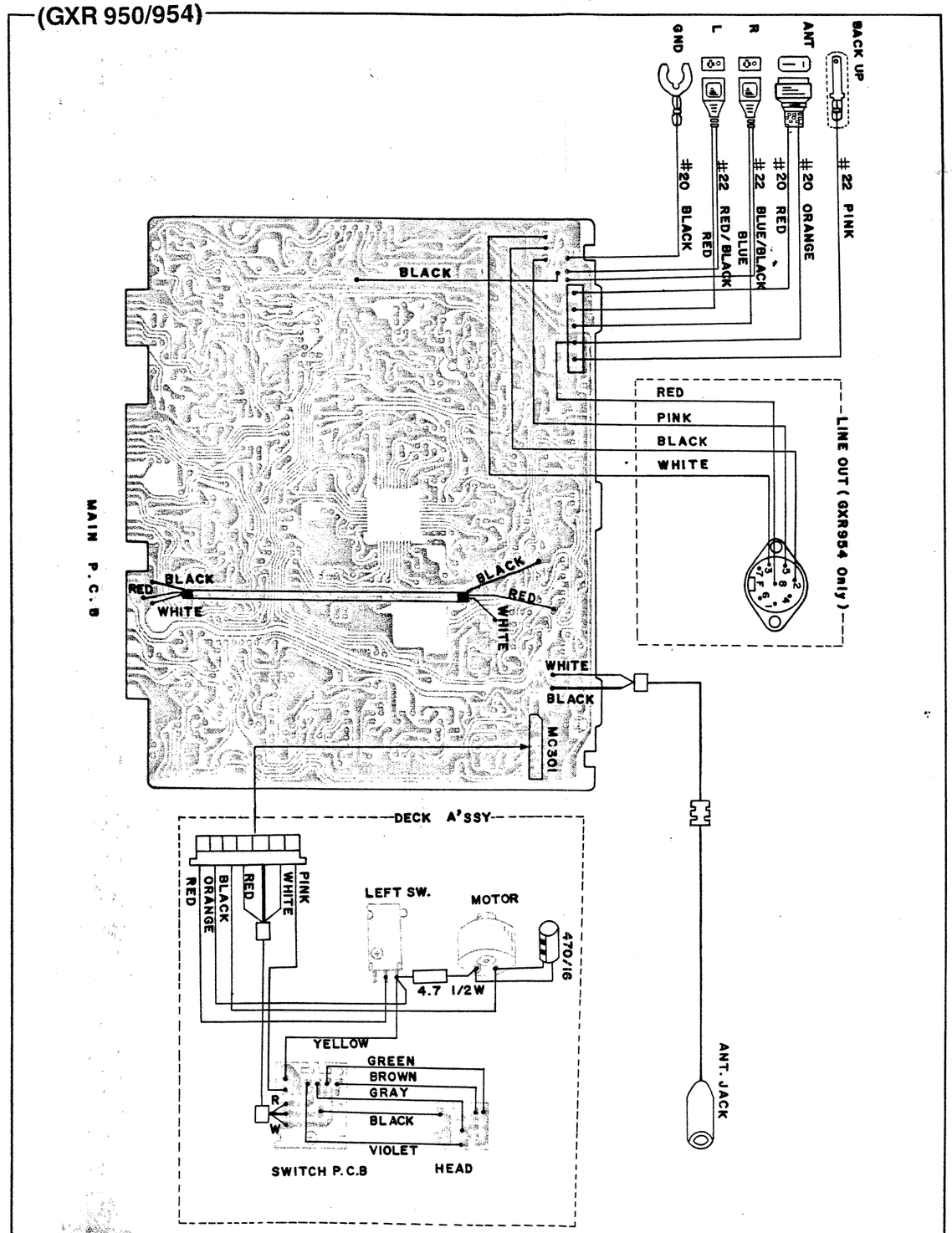


WIRING DIAGRAM

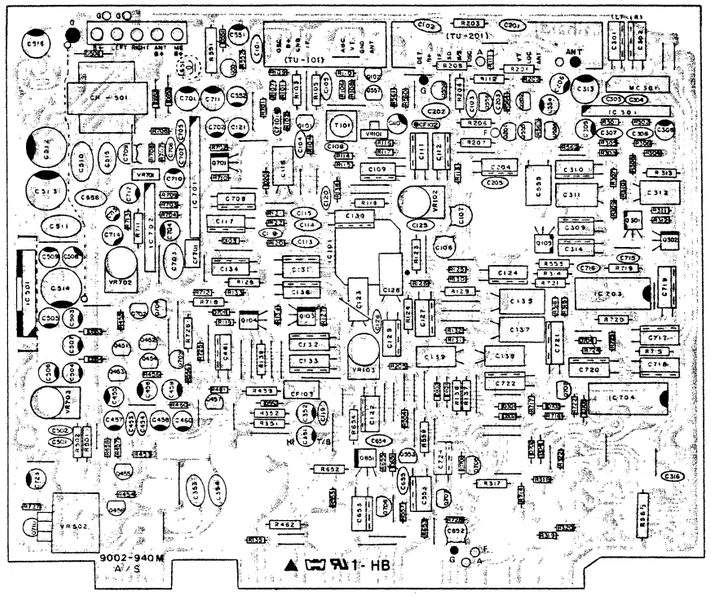
(GXR 949S/953S)



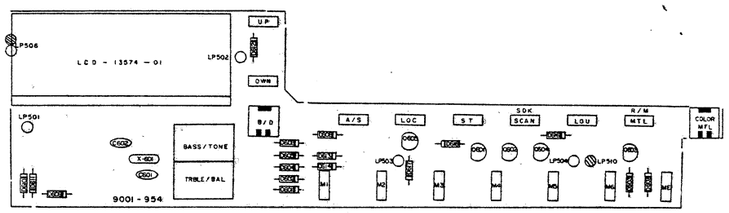
(GXR 950/954)



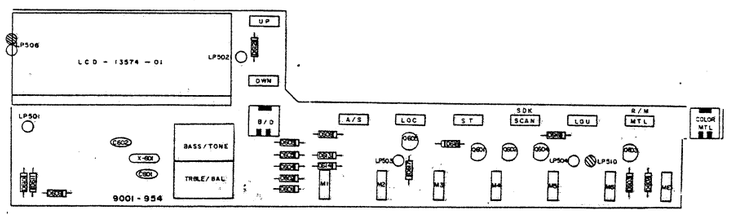
(GXR 950)



MAIN P.C. BOARD



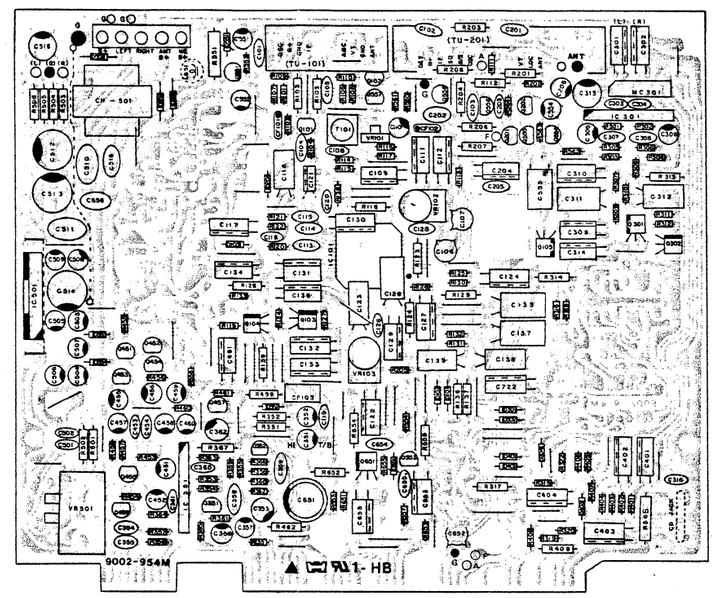
FRONT P.C. BOARD (TOP VIEW)



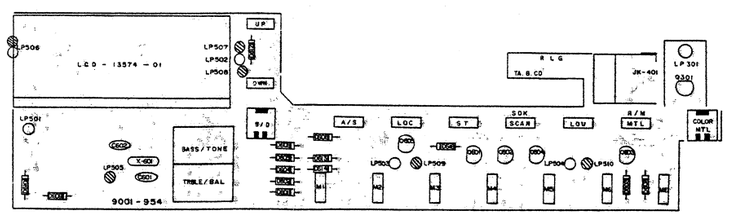
FRONT P.C. BOARD (BOTTOM VIEW)

P.C. BOARD

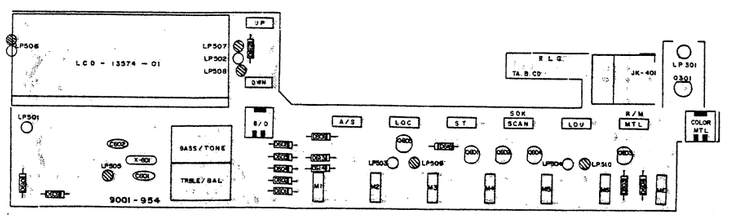
(GXR 953S)



MAIN P.C. BOARD



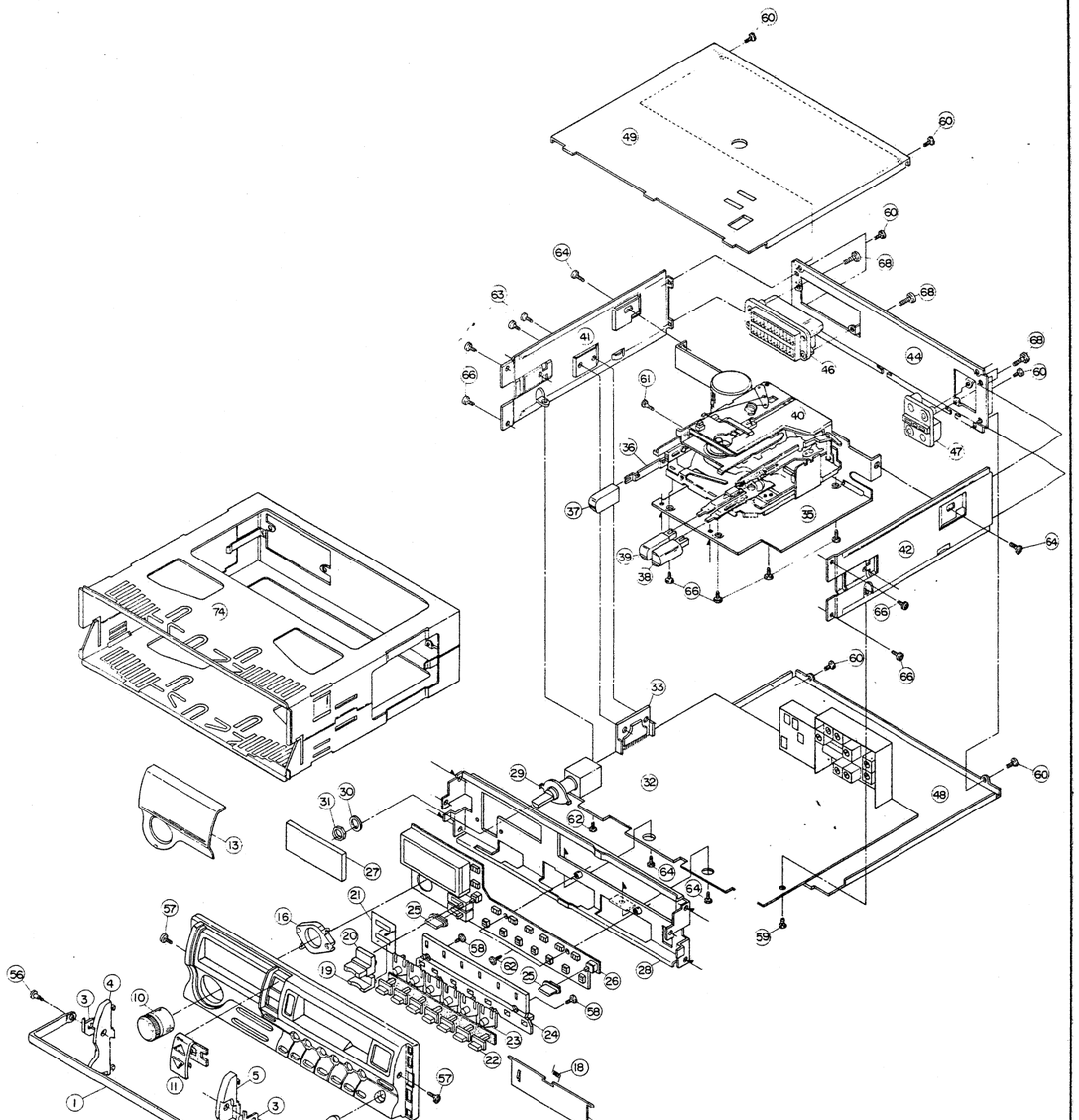
FRONT P.C. BOARD (TOP VIEW)



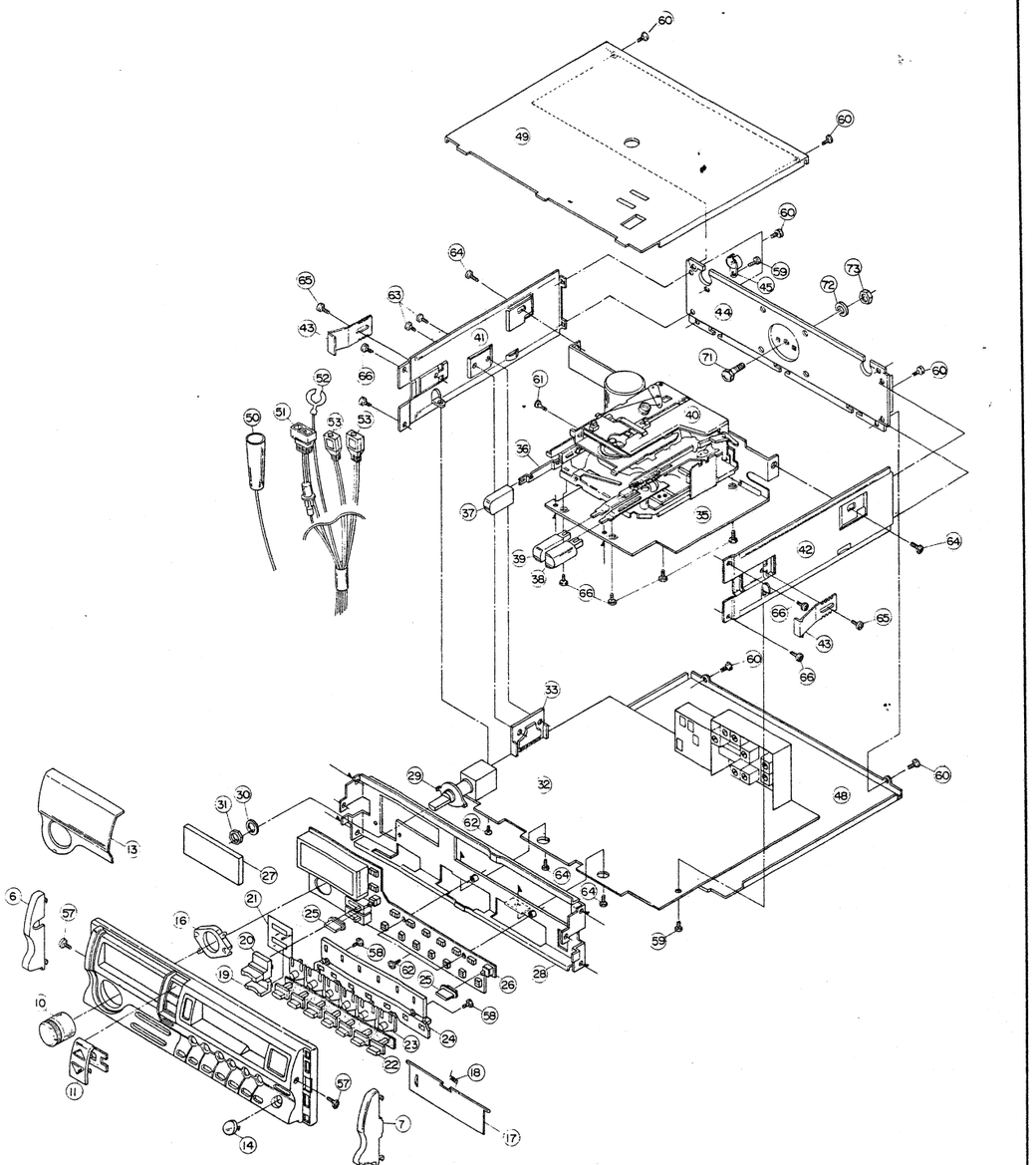
FRONT P.C. BOARD (BOTTOM VIEW)

CABINET EXPLODED VIEW

(GXR 949S)

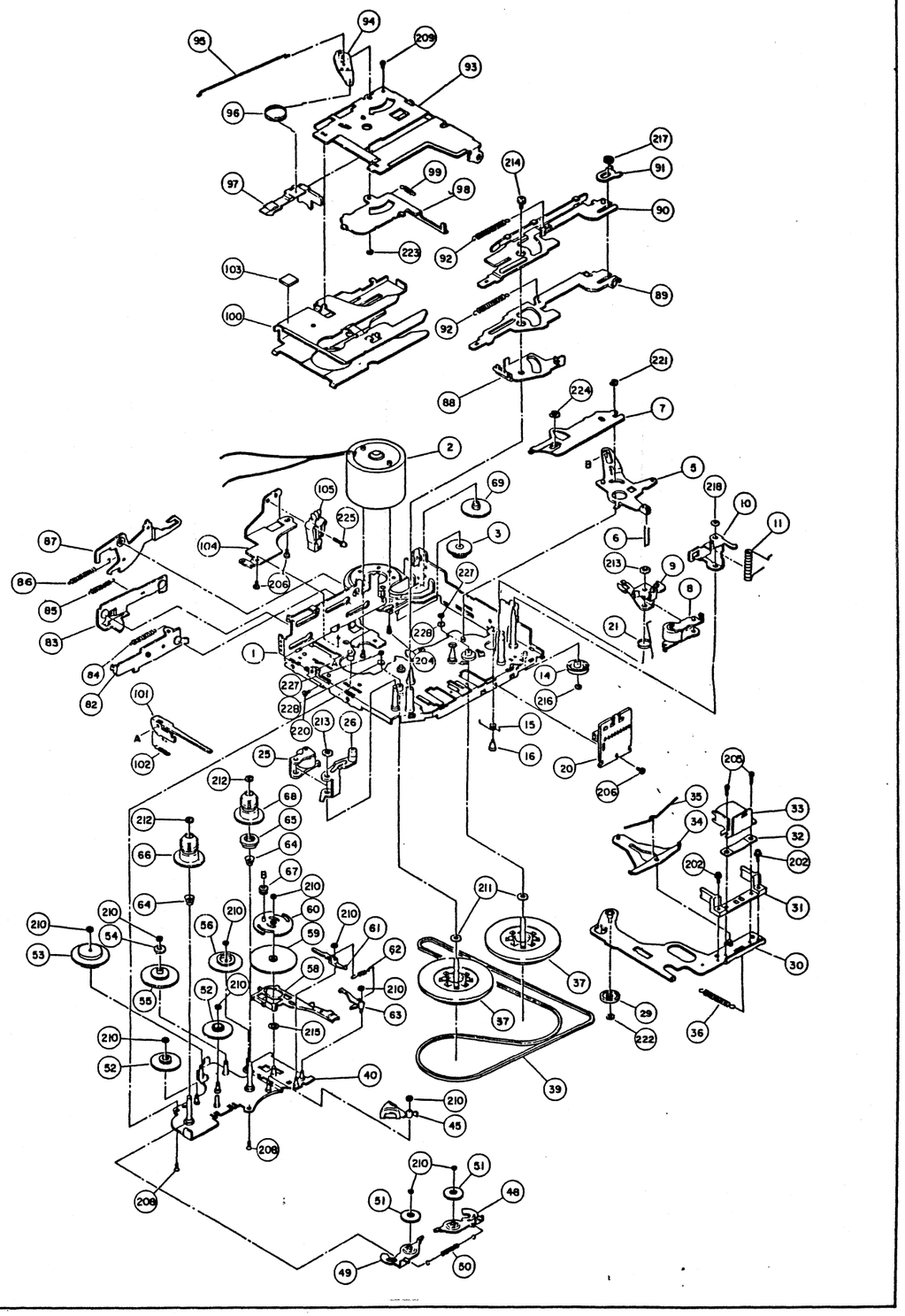


(GXR 950)



MECHANISM EXPLODED VIEW

TN-717MH-01



PARTS LIST

• MECHANISM PARTS LIST (TN-717MH-01)

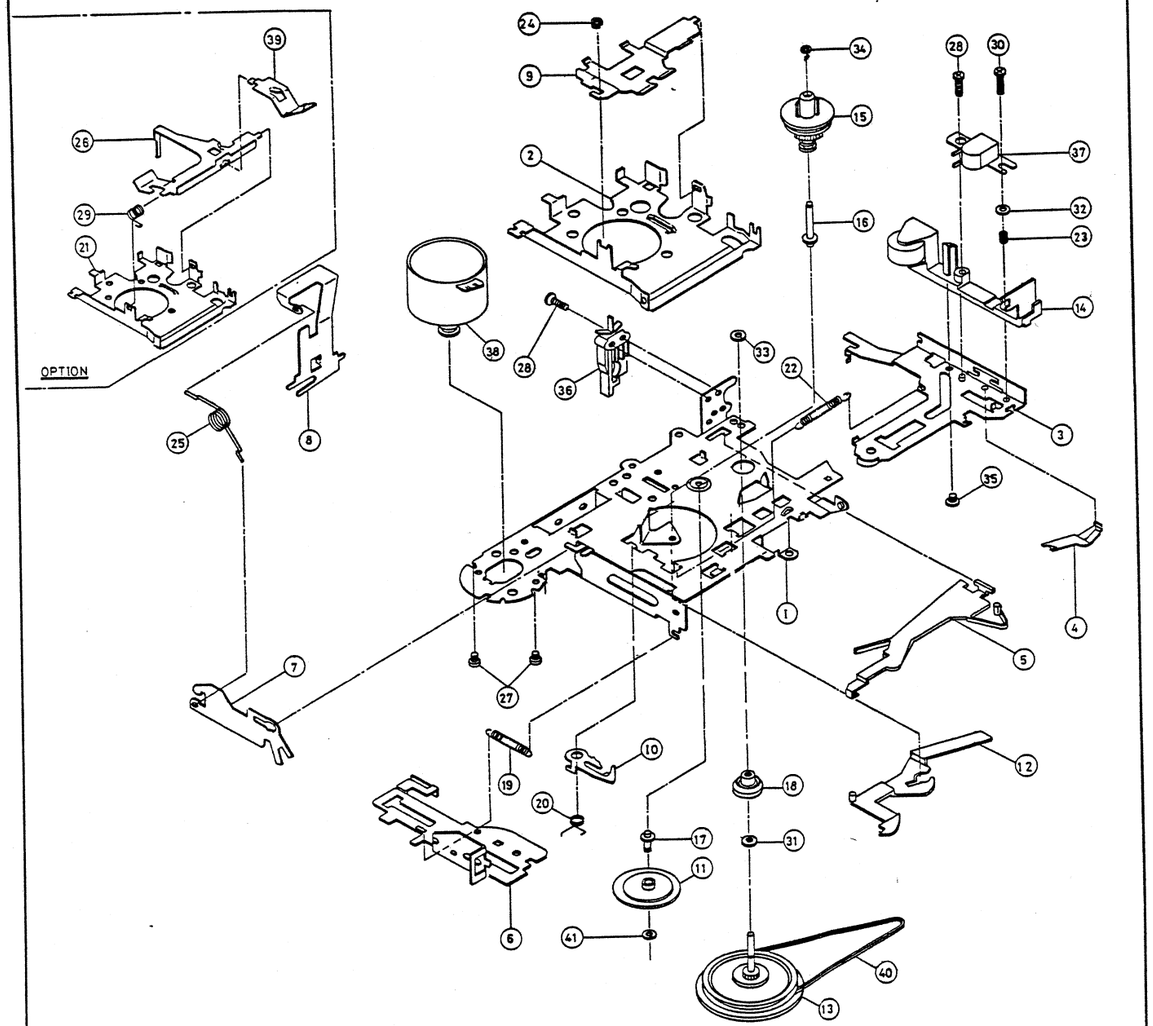
Ref No.	Part No.	Description	Q'ty
1	1840-01-510	Chassis Ass'y	1
2	1840-01-317	Motor Ass'y	1
3	1840-01-57	Main Gear	1
5	1840-01-24A	Change Plate	1
6	1840-01-27	Head Switch Spring	1
7	1840-03-14	Main Plate (Z)	1
8	1840-04-309	Pinch Roller Arm (F) Ass'y	1
9	1840-04-06	Trigger & Stop Arm Actuator	1
10	1840-05-54	F.R (FF. REW) Lock Plate B	1
11	1840-05-52	F.R (FF. REW) Lock Spring	1
14	1840-01-21	Center Pulley B	1
15	1840-01-29	Control Spring	1
16	1840-01-31	Collar Screw	1
20	1840-06-301	Print Base Ass'y (H)	1
21	1840-04-04	Trigger & Stop Arm Actuator Spring	1
25	1840-04-310	Pinch Roller Arm (R) Ass'y	1
26	1840-04-311	Pull Plate Ass'y	1
29	1730-03-19	Head Plate Roller M	1
30	1840-03-510	Head Panel Ass'y	1
31	1840-03-08	Tape Guide	1
32	1840-03-10	Head Spring Plate	1
33	6202-03-11	Head 217-25-63	1
34	1840-03-11	Pinch Roller Actuator	1
35	1730-03-23	Pinch Roller Spring	1
36	1840-03-24	Head Panel Spring M2	1
37	1840-04-308	Flywheel Capstan Ass'y	2
39	1840-04-30	Main Belt	1
40	1840-02-515	Main Gear Plate Ass'y	1
45	1840-02-38N	End Detector Plate (F)	1
48	1840-02-516	Take Up Gear Plate (F) Ass'y	1
49	1840-02-517	Take Up Gear Plate (R) Ass'y	1
50	1840-02-49	Take Up Gear Plate Spring C	1
51	1840-02-12	FF Gear	2
52	1840-02-37	FF & Take Up Gear	2
53	1840-02-321	FF. REW Clutch Ass'y	1
54	1840-02-28	Device Gear (Upper)	1
55	1840-02-29	Device Gear (Lower)	1
56	1840-02-27	Device & Trigger Stop Arm Gear	1
58	1840-02-81	End Sensing Plate C	1
59	1840-02-72	Trigger & Stop Arm Actuator Gear	1
60	1840-02-20A	Turn Over Gear	1
61	1840-02-24	Stop Arm	1
62	1840-02-79	Trigger & Stop Arm Spring C	1
63	1840-02-82	Trigger Arm	1
64	1840-02-48	End Detector Spring	1
65	1840-02-50	End Detector Piece	1
66	1840-02-325	Take Up Reel Sub-Ass'y	1
67	1840-01-26	Turn Over Gear Collar	1
68	1840-02-324	Take Up Reel Sub-Ass'y	1
69	1840-01-55	Center Gear	1
82	1840-08-516	Push Lever Ass'y	1
83	1840-08-515	Cassette Case & Head Panel Push Plate Ass'y	1
84	1840-08-07	Push Lever Spring	1
85	1840-08-55	Cassette Case & Head Panel Spring E	1
86	1840-08-10	Lift Up Lever Spring	1
87	1840-08-08	Lift Up Lever B	1
88	1840-05-26	FF. REW Bracket	1
89	1840-05-62	REW Lever	1
90	1840-05-61	FF. Lever	1
91	1840-05-56	Program Change Plate	1
92	1840-05-53	FF. REW Lever Spring	2

PARTS LIST

Ref No.	Part No.	Description	Q'ty
93	1840-08-12	Case Lifter	1
94	1840-08-517	Pack Eject Plate Ass'y	1
95	1840-08-23	Pack Eject Spring	1
96	1840-08-14	Turn Over Spring	1
97	1840-08-13G	Pack Slider	1
98	1840-08-18	Cassette Detecting Plate	1
99	1840-08-20	Cassette Detecting Spring	1
100	1840-08-22	Cassette Case	1
101	1840-03-25	Timing Plate	1
102	1710-02-16	Spring	1
103	1840-08-21	Cushion Rubber	1
104	1840-07-34	Squelton Switch Bracket	1
105	6401-06-05	Squelton Switch (MSW-5201GK)	1
202	9078-00-00	Tams Screw 2.0×5	
204	9548-00-00	Camera Screw 2.0×2	
205	9722-00-00	Screw (+ . −) Special 2.0×4	
206	9800-00-00	Camera Screw (Tapping) S2.0×3	
208	9809-00-00	Camera Screw (Flat) 2.0×3.5	
209	9801-00-00	Camera Screw (Tapping) S2.0×4	
210	9421-00-00	Polyslider Washer (Cut) 1.2×3.0×0.25	
211	9429-00-00	Polyslider Washer 2.1×5.0×0.13	
212	9793-00-00	Polyslider Washer (Cut) 1.6×3.4×0.3	
213	9744-00-00	Polyslider Washer (Cut) 2.1×5.0×0.4	
214	9999-18-01	Camera Screw (Tams) 2.6×4.5	
215	9794-00-00	Lumilar Washer 3.1×4.8×0.1	
216	9927-00-00	Polyslider Washer (Cut) 0.85×2.8×0.2	
217	9999-03-03	Polyslider Washer (Cut) 3.0×6.0×0.4	
218	9743-00-00	Polyslider Washer (Cut) 1.6×3.8×0.3	
221	9497-00-00	E Ring (B) Special 1.5	
222	9499-00-00	E Ring 1.2	
223	9500-00-00	E Ring 1.5	
224	9502-00-00	E Ring 2.0	
225	9080-00-00	Tams Screw 2.0×8	
227	9999-03-01	Polyslider Washer (Cut) 1.5×3.2×0.5	
228	9999-00-01	Polyslider Wahser 1.8×3.2×0.2	
230	9229-00-00	C Tapping Screw (Bind) 2.0×4	

MECHANISM EXPLODED VIEW

SM-750

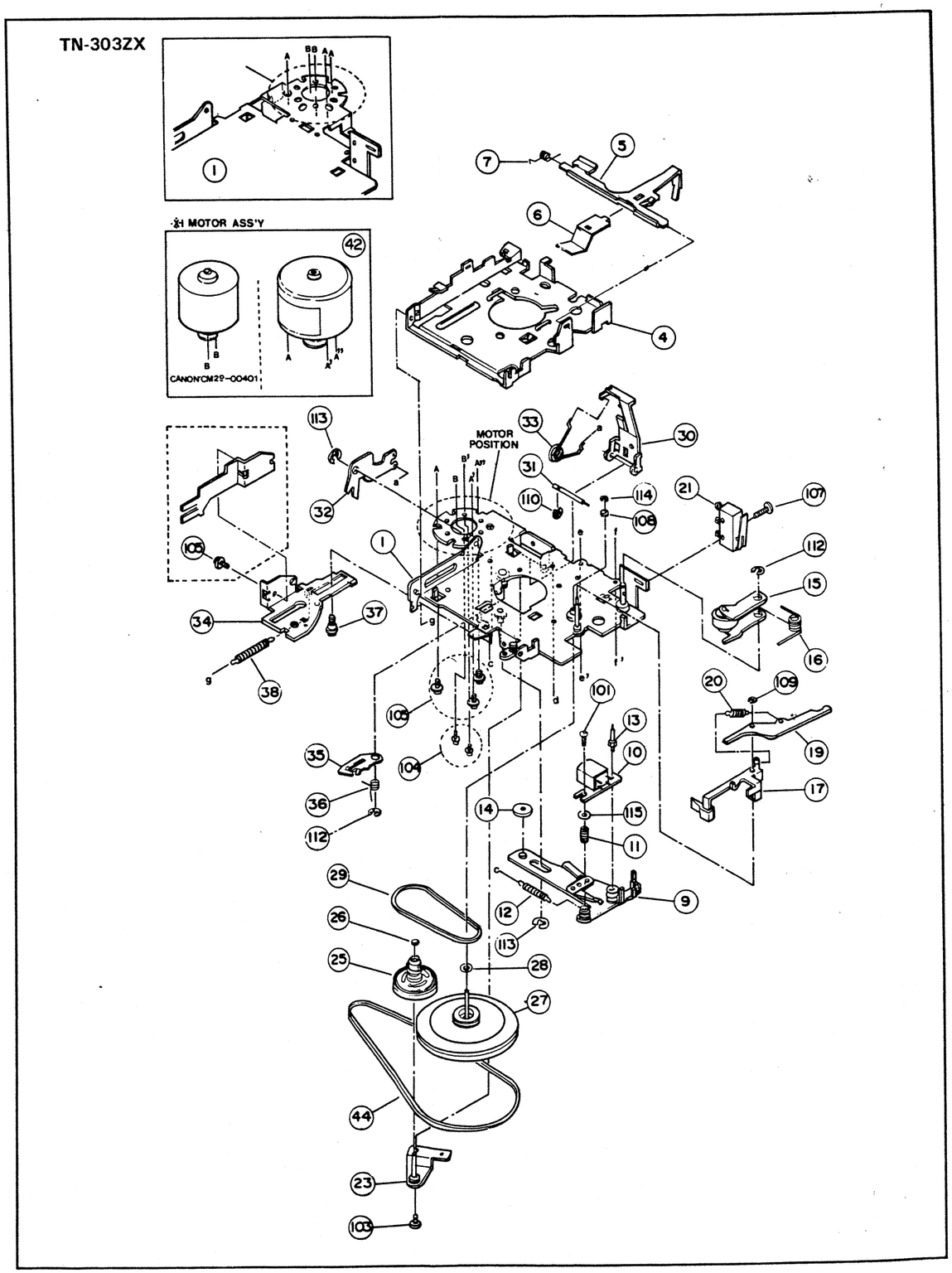


PARTS LIST

• MECHANISM PARTS LIST (SM-750)

NO.	PART NO.	DESCRIPTION	Q'TY
1	FP01AX	MAIN CHASSIS	1
2	1563	CASSETTE CASE	1
3	FP02AX	HEAD CHASSIS	1
4	2853	HEAD CHASSIS LOCK SPRING	1
5	FI01AX	SWITCH LEVER (B)	1
6	2847	EJECT LEVER	1
7	0026	RESET PLATE	1
8	3000	LOCK PLATE	1
9	1565	CASSETTE HOLDER (800)	
10	0031	RATCHET	1
11	FJ01AX	AUTO CAM GEAR (B)	1
12	FI02AX	AUTO SENSOR (B)	1
13	2863	FLYWHEEL ASS'Y	1
14	F402A1	HEAD GUIDE ASS'Y	1
15	F403A1	REEL ASS'Y	1
16	FF01AX	REEL SHAFT	1
17	2858	AUTO CAM SHAFT	1
18	2844	METAL CAPSTAN	1
19	2846	EJECT LEVER SPRING	–
20	0063	RATCHET SPRING	1
21	0016	CASSETTE CASE (700)	1
22	FS02AX	HEAD CHASSIS SPRING	1
23	0064	AXIMUTH SPRING	1
24	1566	CASSETTE PUSH SPRING (800)	1
25	1192	LOCK PLATE SPRING	1
26	0024	CASSETTE HOLDER (700)	1
27	0483	SCREW PH M2.6×2.8	2
28	1160	SCREW BH T/TTITE M2×8	2
29	0062	CASSETTE HOLDER SPRING (700)	1
30	0054	SCREW PH M2×9 (+.–)	1
31	1883	P.S.W 0.25T×1.85×3.2	1
32	0076	PLAIN WASHER 0.5×2.1×5	1
33	3455	P.S.W(C) 0.4T×1.5×3.2	1
34	0081	P.S.W 0.25T×1.7×3.2	1
35	1791	PINCH ROLLER SCREW	1
36	1151	Q/A SWITCH(B) TC18-021	1
37	2683	HEAD P (S-202)	1
38	F401A1	MOTOR ASS'Y	1
39	0025	CASSETTE PLATE SPRING	1
40	2861	MAIN BELT	1
41	3005	P.S.W(C) 0.3T×1.6×3.2	1

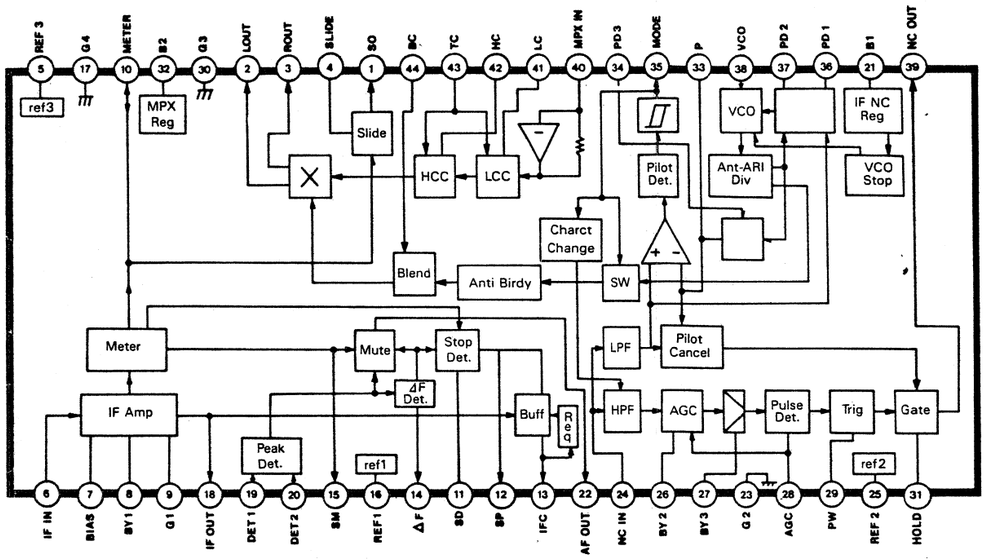
MECHANISM EXPLODED VIEW



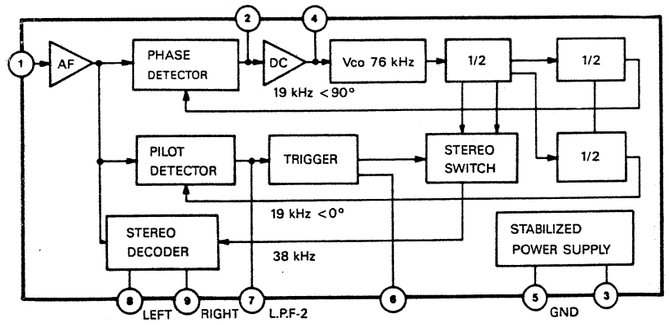
Ref No.	Part No.	Description	Q'ty
106	9098-00-00	Machine Screw 2.6×6	1
107	9229-00-00	Machine Screw 2.3×10	1
108	9424-00-00	Washer 2×3.5×0.5t	1
109	9499-00-00	E Ring ϕ1.2	1
110	9500-00-00	E Ring ϕ1.5	1
112	9504-00-00	E Ring ϕ2.5	2
113	9505-00-00	E Ring ϕ3	2
114	9497-00-00	E Ring ϕ1.5	1
115	9316-00-00	Washer ϕ2.1×ϕ5×0.2t	1

IC EQUIVALENT CIRCUITS

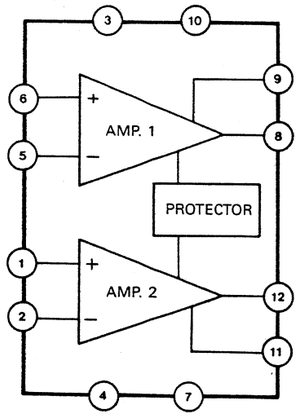
IC101 KIA6050F AM IF/IAC/MPX



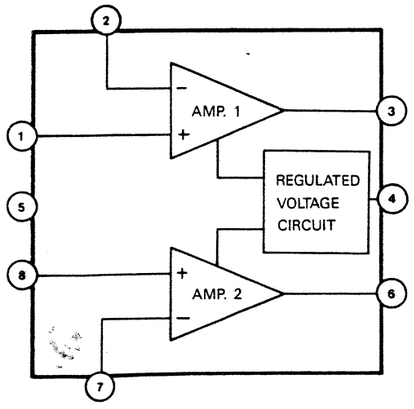
IC702 KIA7343AP, 6043S DK



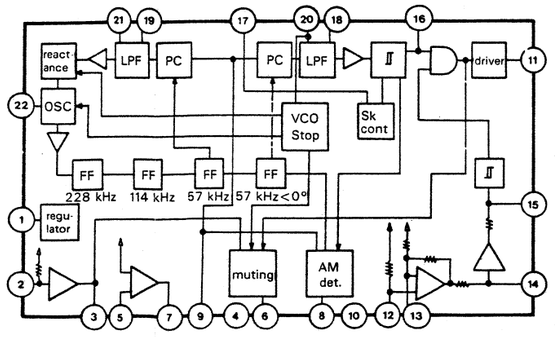
IC501 KIA7299, 6299 POWER



IC301 KIA8125S, 6225S TAPE

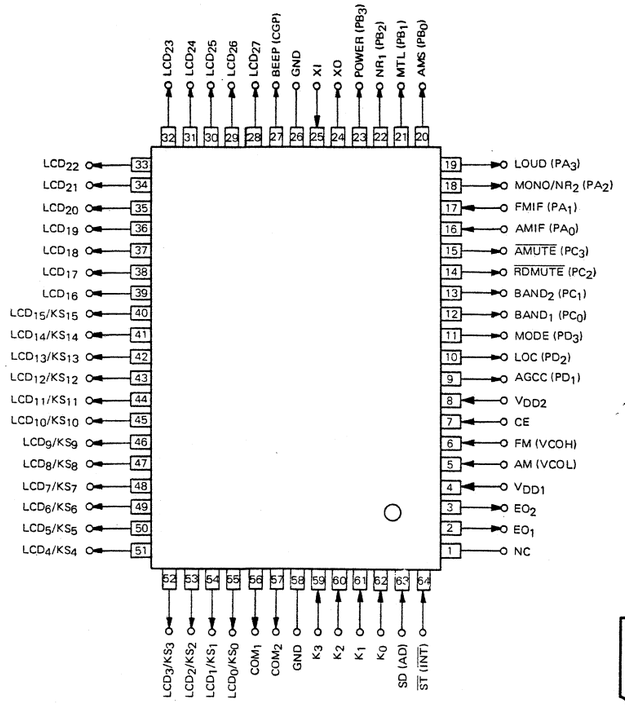


IC701 LA2220 SK-DETECTOR

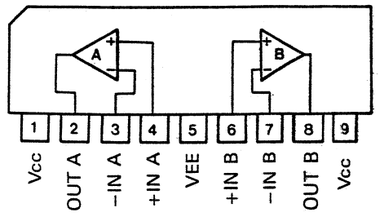


IC EQUIVALENT CIRCUITS

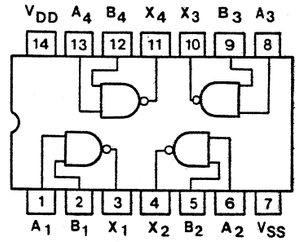
μPD1719G-011 PLL



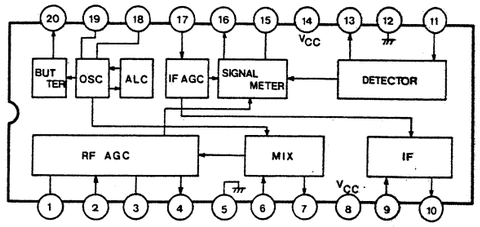
IC351 KIA4558S, 7558S TONE



IC704 GD4011B

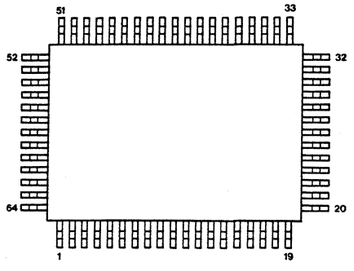


LA1135 AM IF

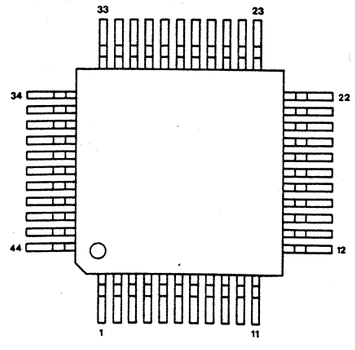


SEMICONDUCTOR CONFIGURATIONS

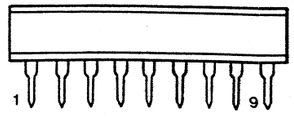
μPD1719G-011



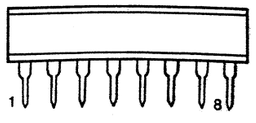
KIA6050F



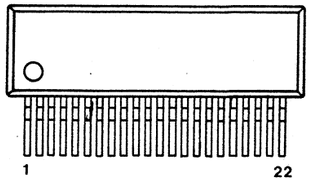
KIA7343AP KIA4558S



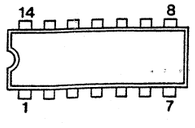
KIA8125S



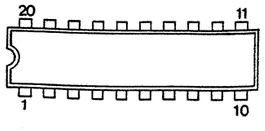
LA2220



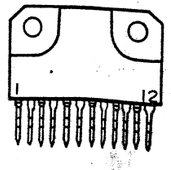
GD4011B



LA1135

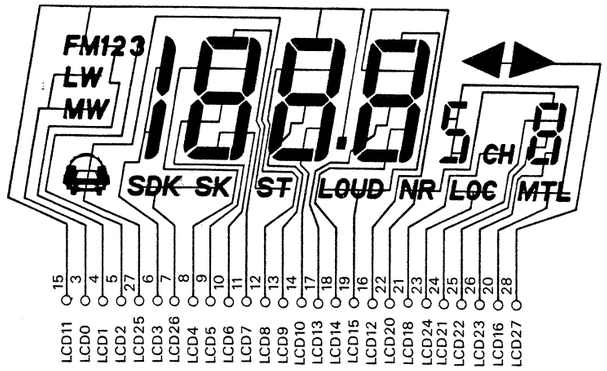


KIA7299



DISPLAY

SEGMENT


FM123
LW
MW
SDK SK ST LOUD NR LOC MTL
CH
15 3 4 5 27 6 7 8 9 10 11 12 13 14 17 18 19 16 22 21 23 24 25 26 20 28
LCD11 LCD0 LCD1 LCD2 LCD25 LCD3 LCD26 LCD4 LCD5 LCD6 LCD7 LCD8 LCD9 LCD10 LCD13 LCD14 LCD15 LCD12 LCD20 LCD18 LCD24 LCD21 LCD22 LCD23 LCD16 LCD27

COMMON

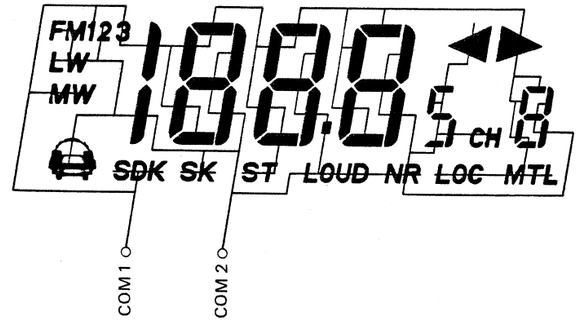
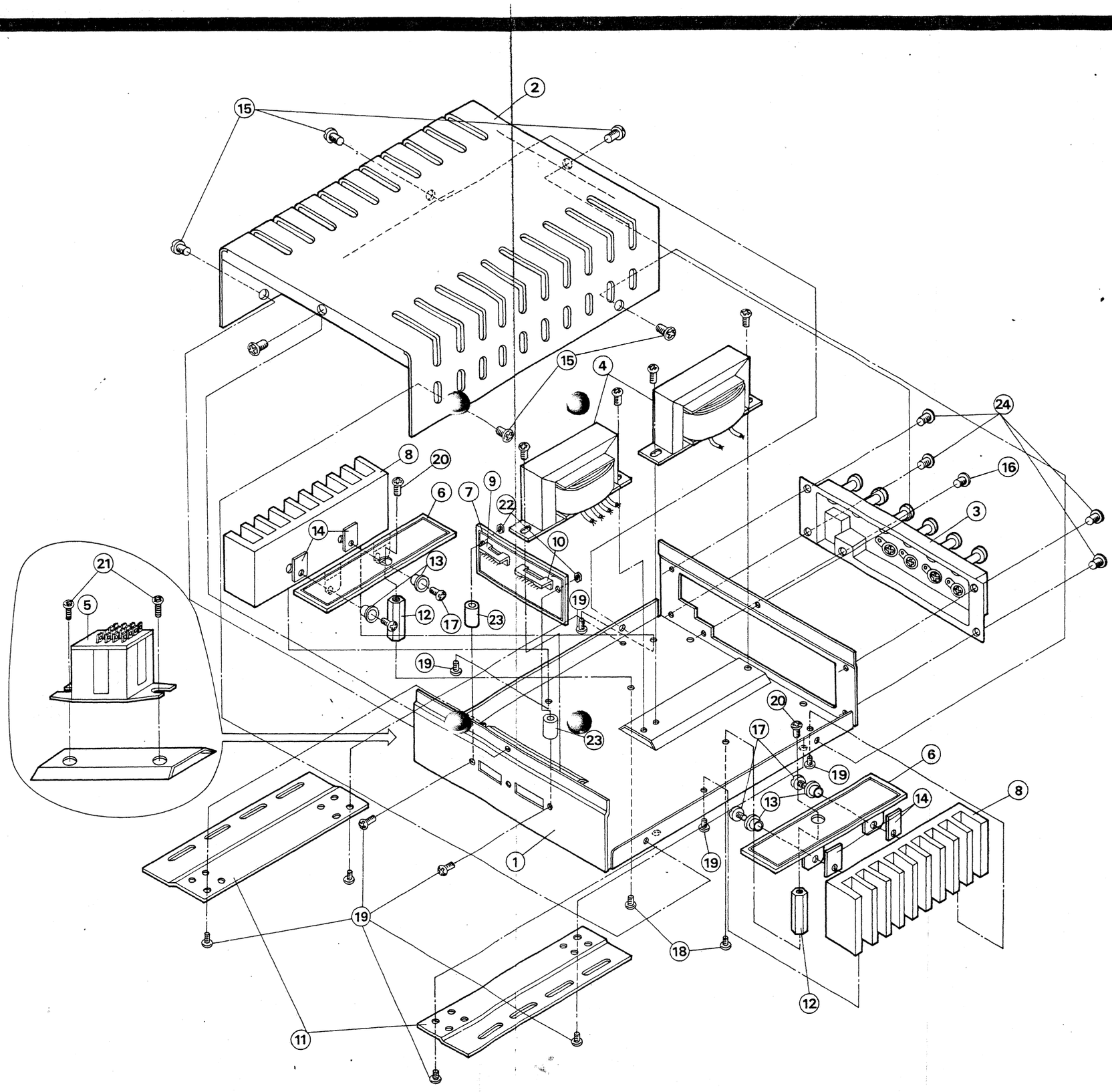


TABLE OF VOLTAGE

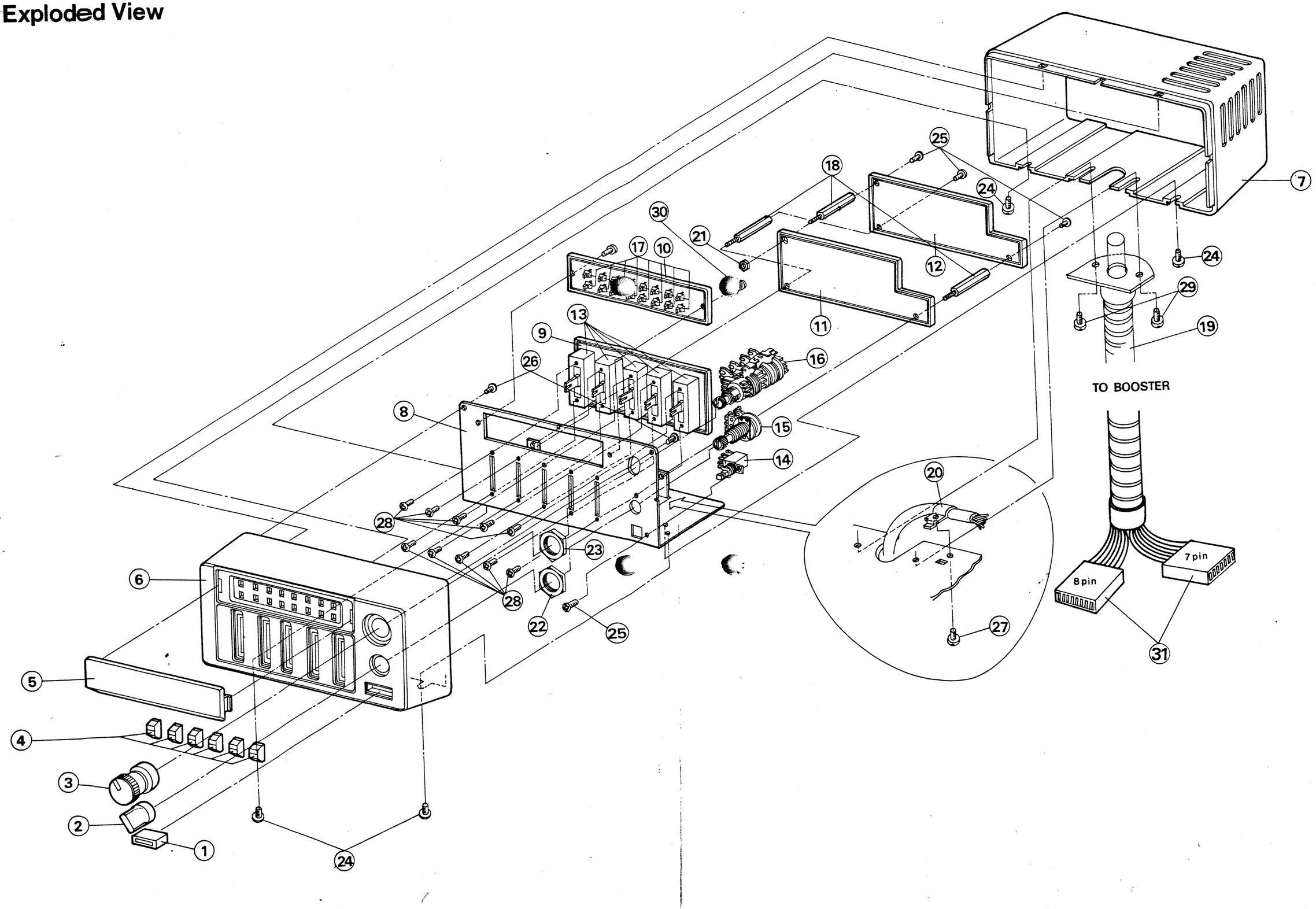
IC NO. PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
IC601	0	0.74	1.14	4.63	0	1.91	4.73	4.63	0	0	4.61	4.61	0.02	4.61	0	0	0	0	0	0	0	0
	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
	0	2.31	2.23	0	0	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.36	2.36	2.36	2.36	2.36	2.36
	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64		
	2.36	2.36	2.36	2.32	2.36	2.32	2.32	2.32	2.32	2.32	2.32	2.27	2.27	0	4.3	2.65	2.65	2.61	0	5.95		

IC NO PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
IC101	0	2.96	2.96	0.71	5.07	2.91	2.91	2.91	0	0.72	0	0.04	7.37	4.47	1.66	4.71	0	2.55	2.53	2.49	8.27	4.68
	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
	0	2.99	3.03	3.01	2.29	0	0	0	3.82	8.16	3.02	7.15	5.93	7.47	7.47	4.33	2.38	1.71	1.72	3.33	0.09	0

Exploded View

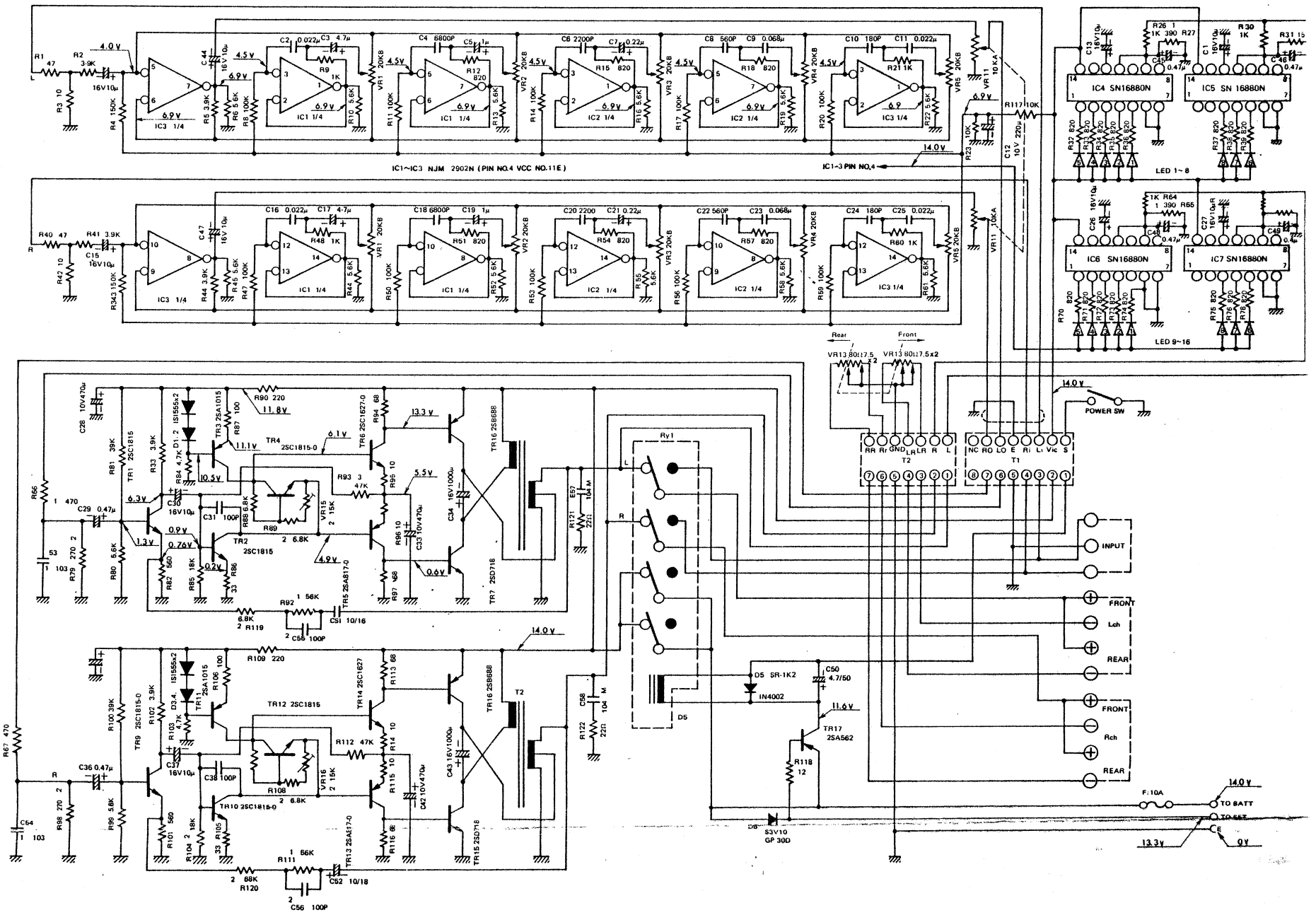


Exploded View

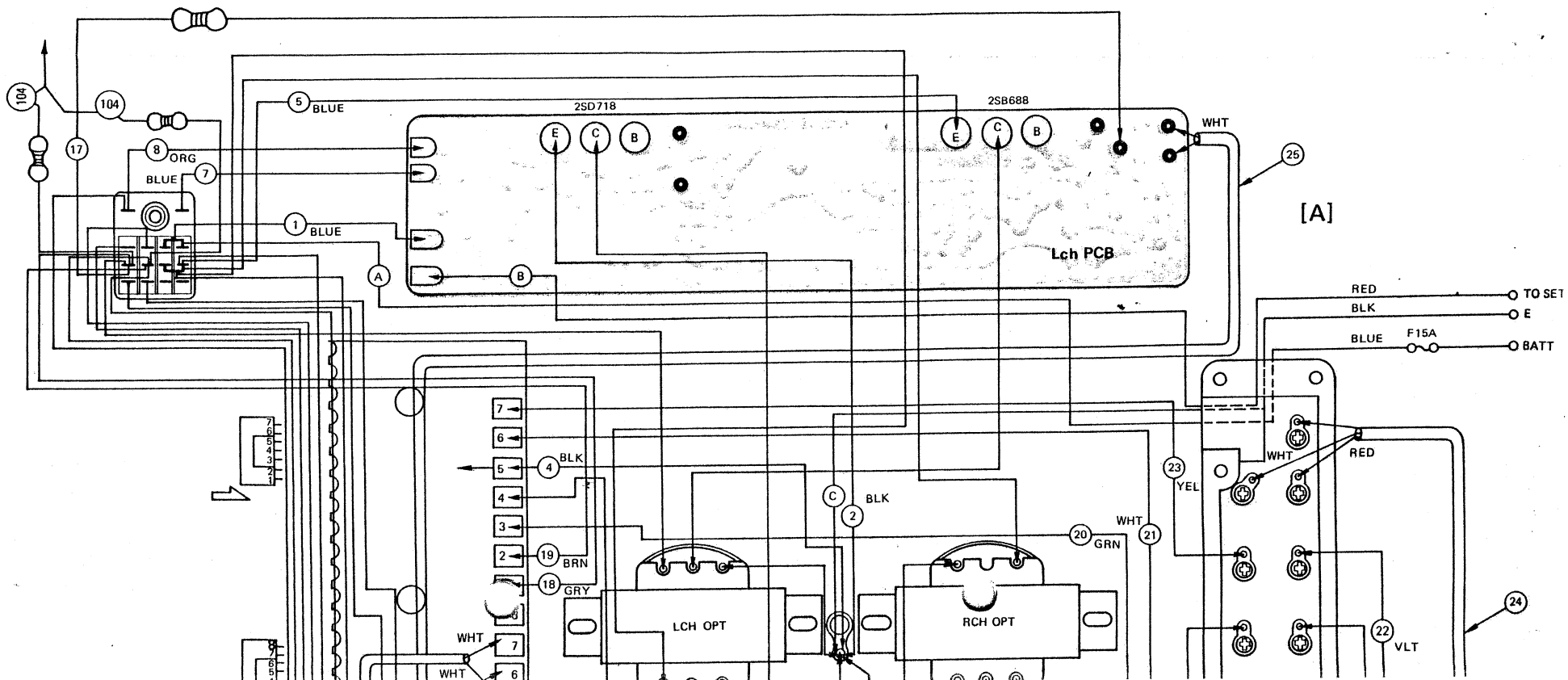


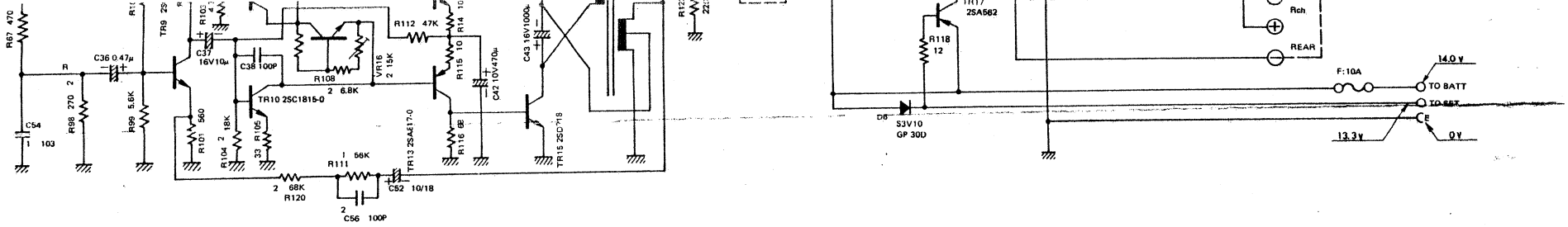
Schematic Diagram

(OLD)

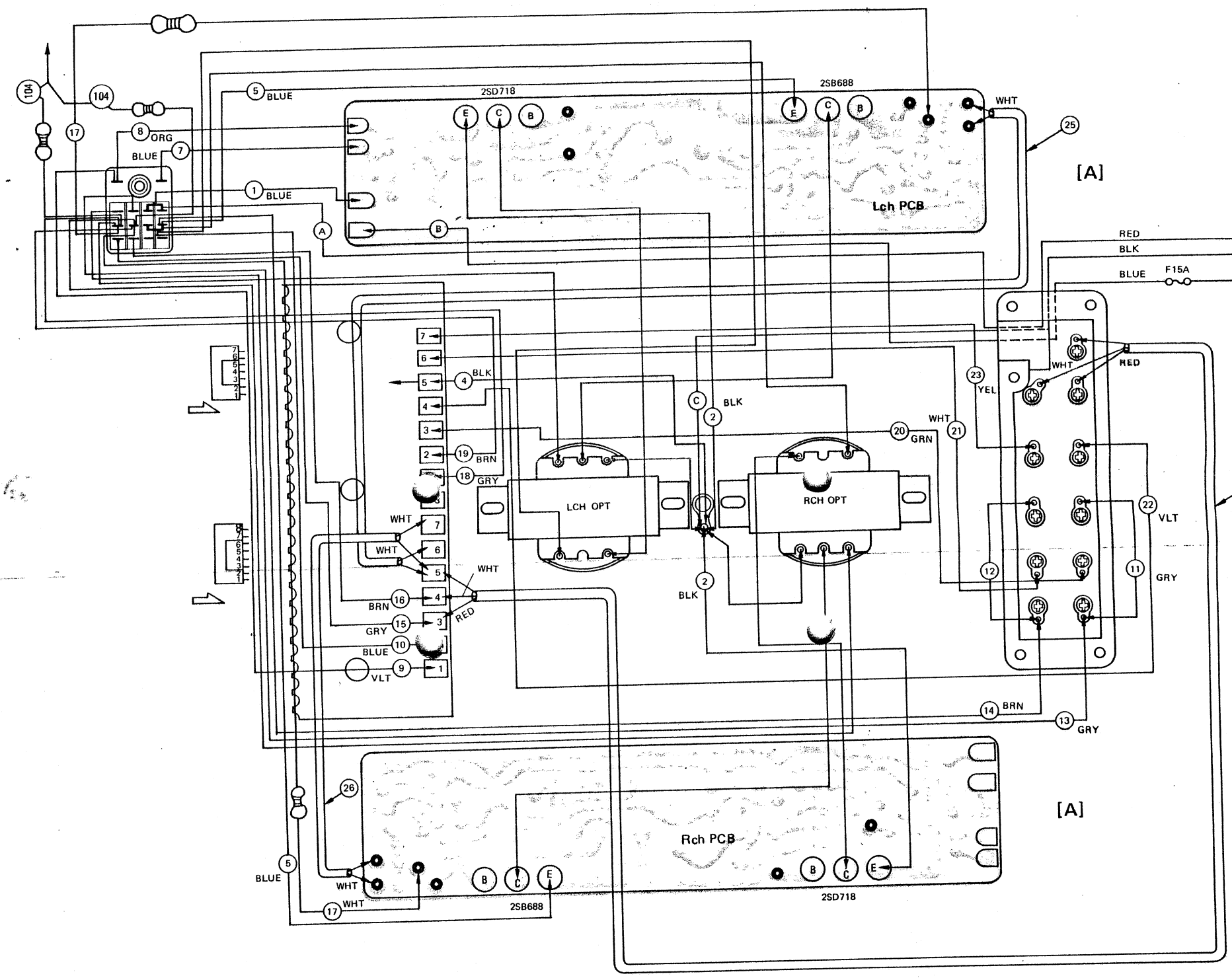


Wiring Connections

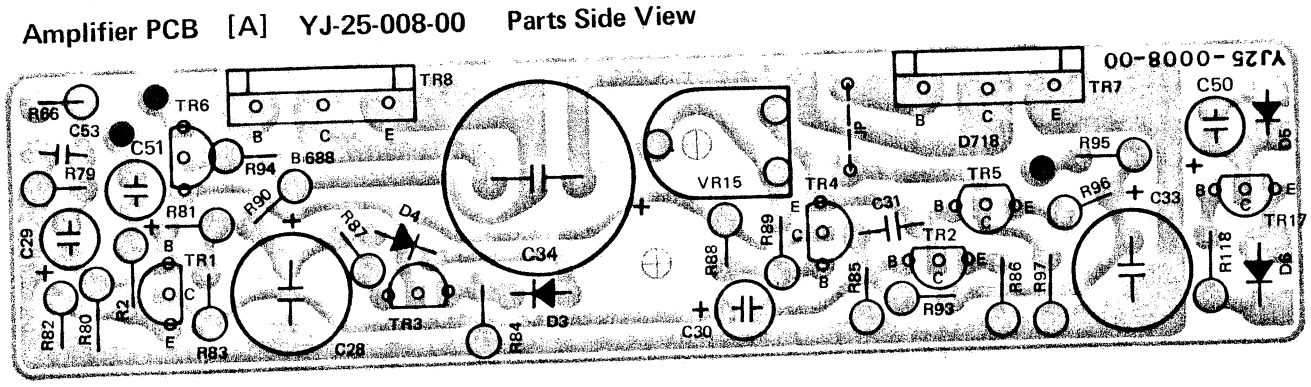




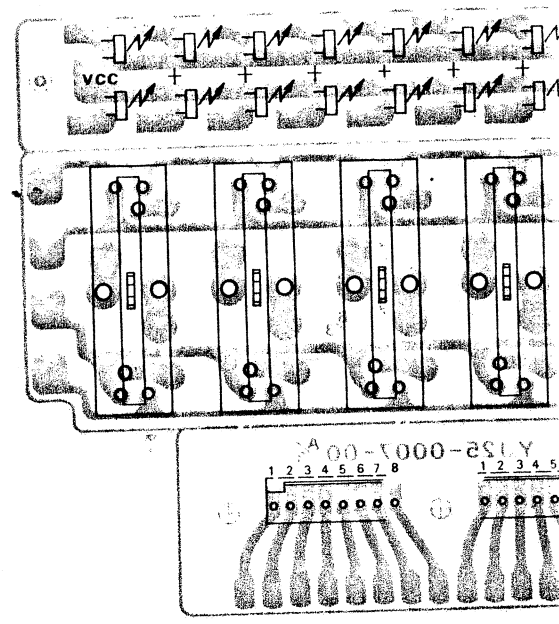
Wiring Connections



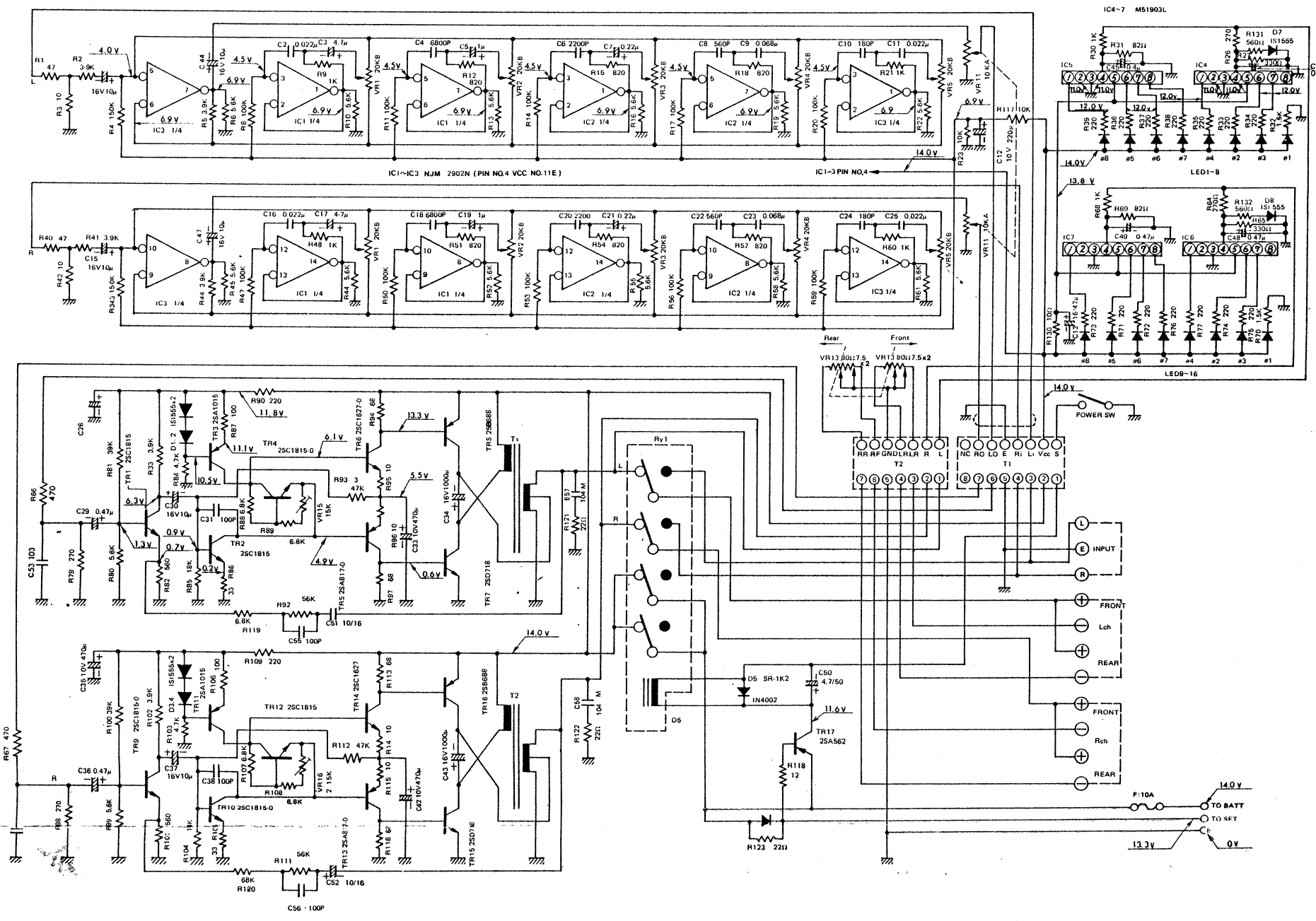
Amplifier PCB [A] YJ-25-008-00 Parts Side View



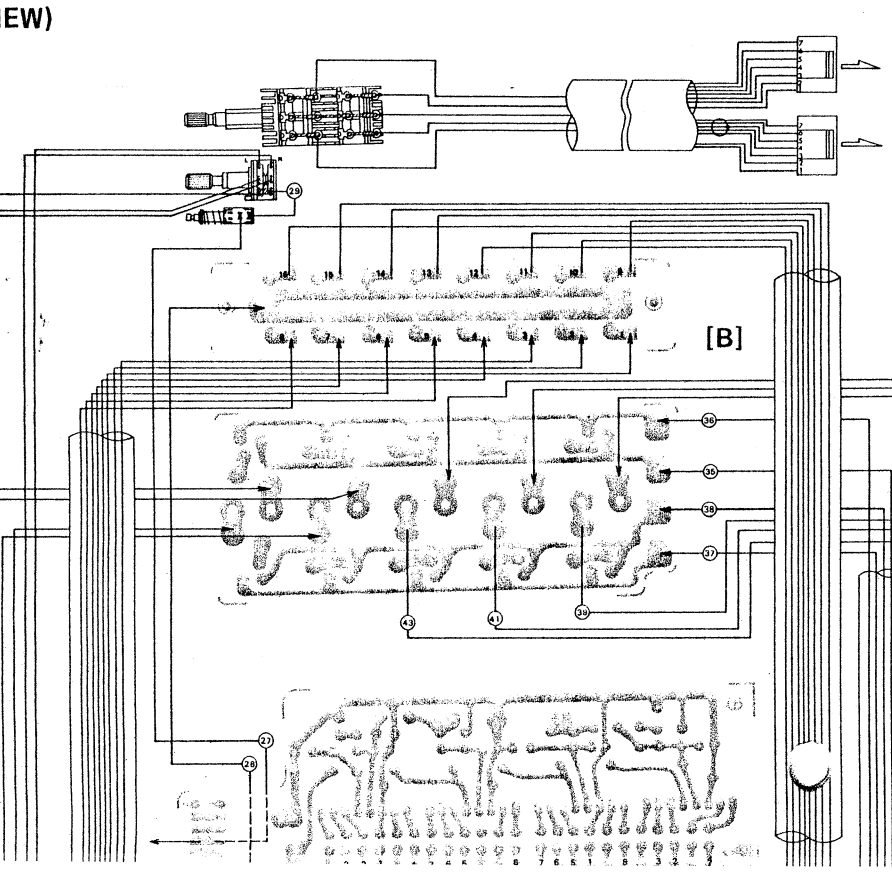
Front Display & Volume PCB [B] YJ-25



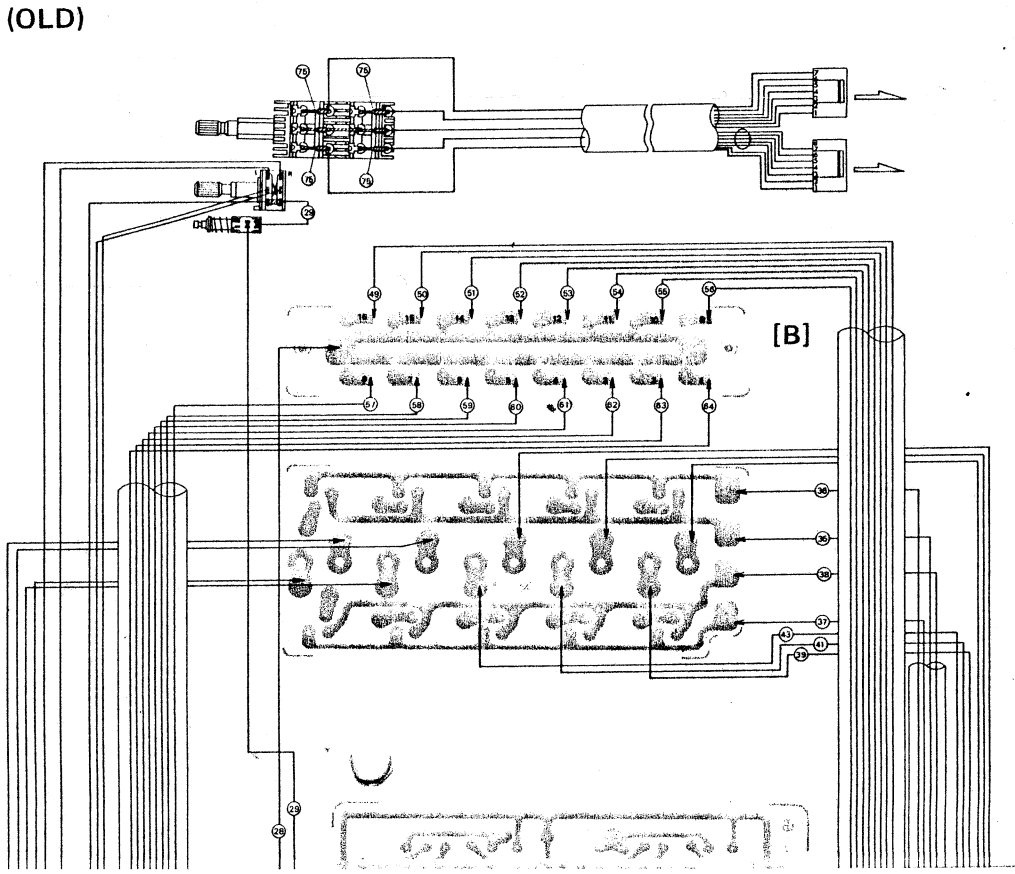
(New)

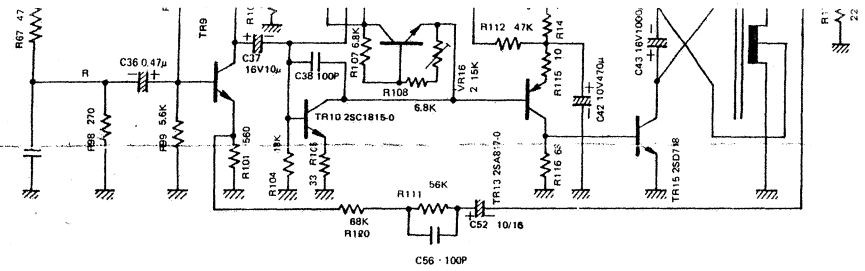

IC1~IC3 NJM 2902N (PIN NO.4 VCC NO.11E)
IC1~3 PIN NO.4
IC4~7 M51903L
LED1~8
LED9~16
POWER SW
INPUT
FRONT
Lch
REAR
Rch
TO BATT
TO SET
IN4002
TR1 2SC1815
TR2 2SC1815
TR3 2SA1015
TR4 2SC1815-O
TR5 2SA817-O
TR6 2SC1627-O
TR7 2SD718
TR9 2SC1815-O
TR10 2SC1815-O
TR11 2SA1015
TR12 2SC1815
TR13 2SA817-O
TR14 2SC1627
TR15 2SD718
TR16 2SB688
TR17 2SA562
T1
T2
Rear
Front

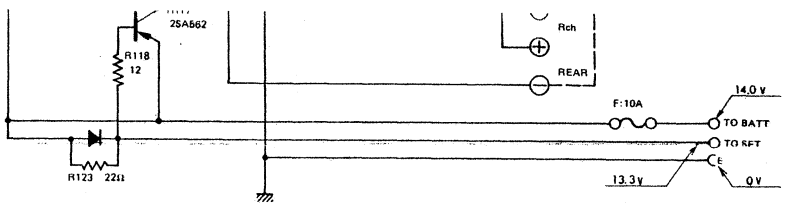
(New)


[B]

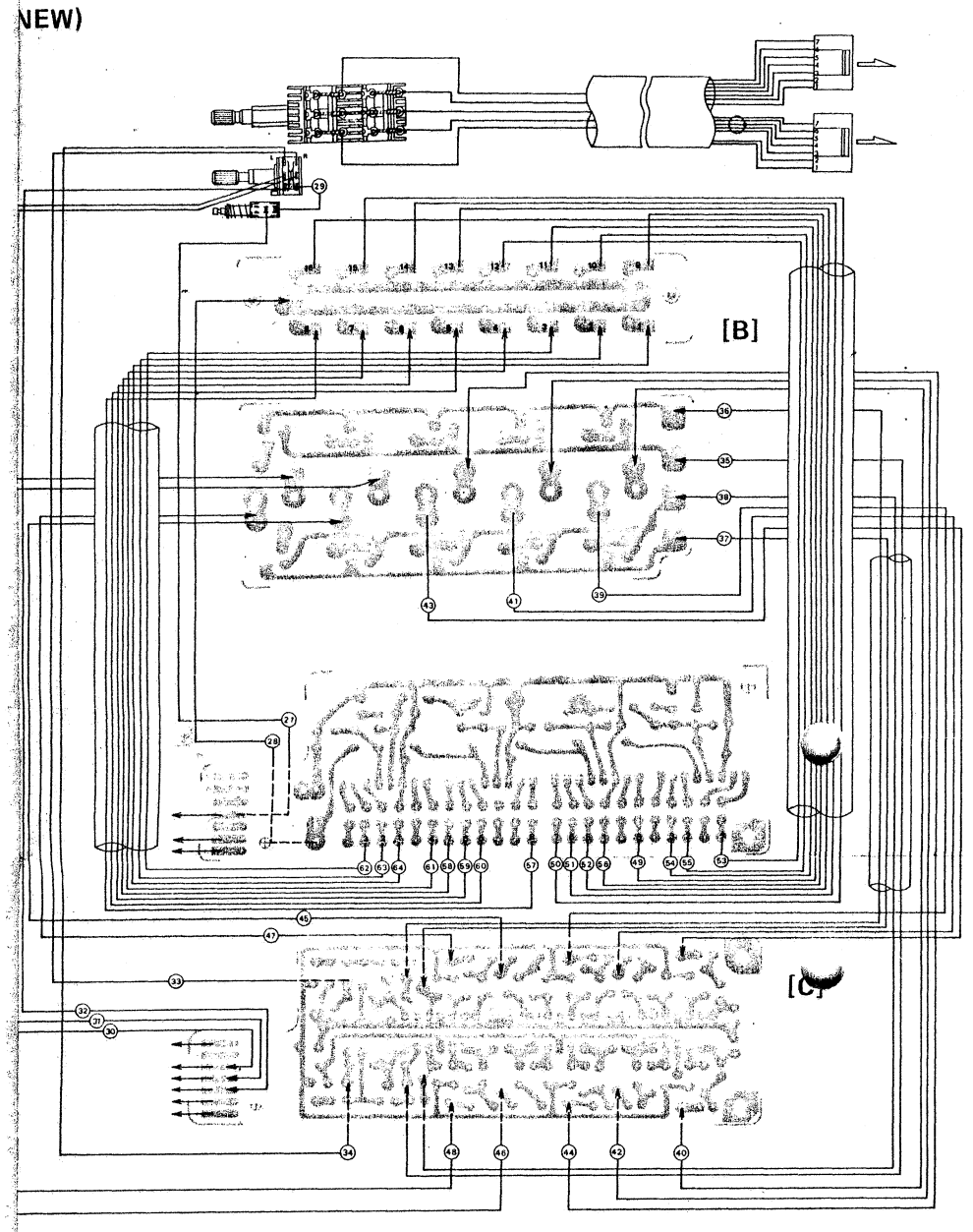
(OLD)


[B]

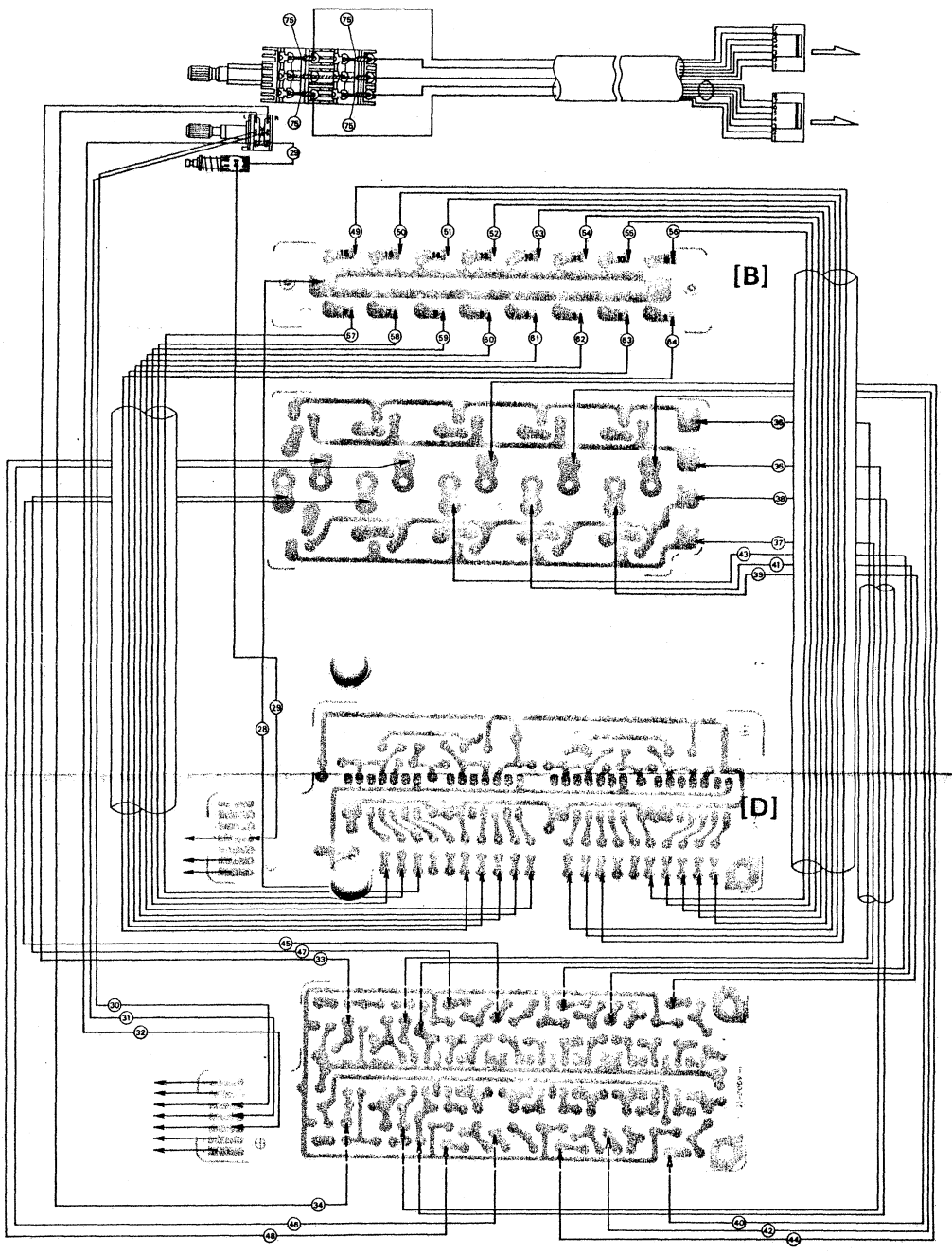




NEW)

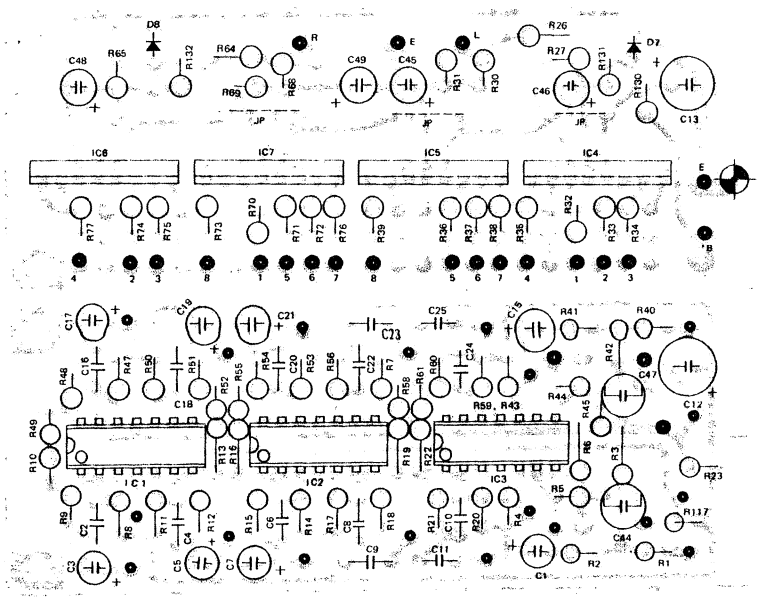


(OLD)



00

(NEW) Equalizer VC PCB [C] YJ-25-0009-00 A/2, B/2



(OLD) Equalizer VC PCB [D] YJ-25-0009-00 A/2, B/2.